THE
ELECTRICAL REVIEW

Volume CXXIX **No. 3340**

Friday, November 28, 1941

Contents

	Page		Page
Editorial—Appliance Maintenance	591	New Croydon Showrooms	607
Bacon Curing	593	Commerce and Industry	609
Floating Power Station	596	D.I.E.E. Area Organisation	612
Correspondence	597	Electricity Supply	613
Personal and Social	599	Financial Section	615
Power Factor. By G. F. Freeman, M.Sc., A.M.I.E.E.	601	New Patents	620
I.M.E.A. Activities	603	American Electrical Exports	621
Institution Proceedings	604	Contract Information	622
Classified Advertisements	73	Index to Advertisers	84

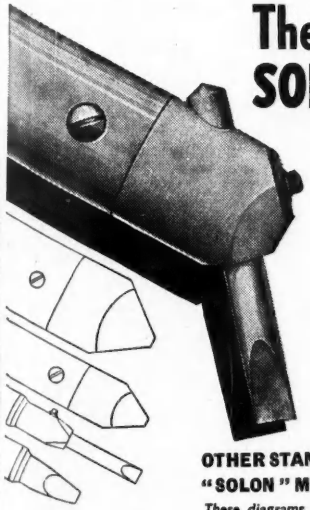
EDITORIAL, ADVERTISING AND PUBLISHING OFFICES: Dorset House, Stamford Street, London, S.E.1

Telegraphic Address: "Ageekay, Sedist, London." Code: A B C. Telephone No.: Waterloo 3333 (35 lines)

Registered at G.P.O. as a Newspaper and Canadian Magazine rate of postage. Entered as Second Class Matter at the New York, U.S.A., Post Office.

Subscription Rates, Postage free: United Kingdom, £1 14s. 8d.; Canada, £1 12s. 6d.; Colonial and Foreign, £1 14s. 8d. per annum.

Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW LTD., and crossed "Lloyds Bank"



The *Round-Pencil Bit* SOLON for small precise work

Industrial type Solon Electric Soldering Irons are made in a range of patterns with bits suitable for a great variety of work. The illustration shows the 125 watt round-pencil bit model. The heating element in all Solons is in direct internal contact with the bit, ensuring steady heat at the point—where you want it. All internal connections are safely tucked away in the bakelite terminal box; accessible, but out of the way of heat and corrosion. Every Solon conforms to Home Office requirements and is subjected to a pressure test of 600 volts to earth for one minute. Complete with 6 feet HENLEY tough rubber-sheathed 3-core flexible.

Made in England by

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD. (27/D), Engineering Sales Department, Milton Court WESTCOTT, DORKING, SURREY

OTHER STANDARD "SOLON" MODELS

These diagrams show the shapes of other Solon models. There are 240, 125 and 65 watt industrial Solons suitable for a wide range of uses.

WRITE FOR LEAFLETS

SOLON TRADE MARK *Electric*

SOLDERING IRON FOR INDUSTRIAL USE

When the Fires of hate have died down - - - -

- - - the Fires of beauty and artistic charm will brighten your homes again. MAGICOAL the original and still the most realistic Fire will bring you FIRE-LIGHT-HAPPINESS once more in a new era of Peace.

Berry's ELECTRIC LTD.

TOUCHBUTTON HOUSE
Newman Street, London, W.1
Telephone : MUSeum 6800 (9 lines)
Also Birmingham, Manchester and Newcastle

PERFORMANCE

First place in athletics goes to the man who gives the best performance. First place should also go to electrical equipment that gives the best performance. Sangamo Weston Electricity Meters, Electrical Instruments and Time Switches will meet the most exacting requirements. Their performance is unexcelled. You can prove this fact by using them.

Illustrated is the Sangamo Type HMT Prepayment Meter which is available for single, dual or triple coin operation. In common with all other Sangamo A.C. Watt-hour Meters this meter is fully compensated for temperature variations over a wide range. It is of course officially approved by the Electricity Commissioners.

SANGAMO WESTON LTD.
GREAT CAMBRIDGE ROAD, ENFIELD, MIDDX.
Tele: Enfield 3434 (6 lines) — 1242 (8 lines) Grams: Britsangco, Enfield

THE
ELECTRICAL REVIEW
THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXXIX. No. 3340. NOVEMBER 28, 1941 6d. WEEKLY

Appliance Maintenance

An Urgent Wartime Need

LIMITATION of supplies and the non-availability of materials have severely curtailed the production of domestic appliances and the scarcity has naturally made existing equipment much more valuable. In fact it was recently reported from Scotland that dealers were charging more for secondhand appliances than they originally cost.

In these circumstances the question of maintenance assumes an even greater importance than it possesses in peacetime. In those spacious days it was easier to condemn appliances that had "gone wrong" especially if their appearance had also suffered, but nowadays dents in kettles and the disappearance of some of the plating do not worry even the most fastidious so long as the equipment does its job.

A good many electricity supply undertakings have looked upon appliance maintenance as a more or less necessary evil although there were shining examples who set up properly equipped departments to deal with the matter and even to make old cookers and water-heaters as good as new.

It is true that most of them endeavoured to confine their service to appliances hired or hire-purchased to consumers. Some of them, however, were willing to look after consumers' own appliances and this should now be general.

Some electrical dealers, too, made repairs a feature of their business, but, generally, contractors also preferred to sell new appliances rather than doctor old ones.

But now that the greater need has arisen it has been accompanied by greater difficulties. Maintenance is not anybody's job and skilled men are needed elsewhere as a rule. It is very doubtful whether electrical contractors will be able, or permitted, to employ men for the purpose, although there may be a possibility of a co-operative arrangement between them to set up a joint repair service in their various districts.

The electricity supply undertakings are more favourably placed in this respect. They are being scheduled as engaged upon essential work and surely it is essential to keep consumers' appliances in proper order. They should therefore not incur the Minister of Labour's displeasure if a part of their staffs is allocated to the work, possibly with the assistance of women.

The position in the United States will eventually be similar to ours : there are already signs of it and at least one concern, the Consolidated Edison Co., of New York, is taking steps to meet it. These have taken the form of a separate company with branches in the various districts of the company's wide area. It will assume the responsibility for the service and repair of all electrical and gas appliances on the parent company's system.

Charges will be standardised as far as possible and if necessary payment by instalments will be arranged. It is proposed that appliance dealers shall act as agents for the new company, receiving a fixed commission. Annual "servicing"

contracts with consumers are also envisaged. A technical staff will be maintained, a part of whose duties will be the education of service men.

Facts and Wishes

IT was very naughty of "Thermax" of the *Gas Times* to break the "truce" recently by making little of electric wash boilers and we feel called upon to comment on his remarks. After confessing what inefficient and unsightly appliances gas wash boilers usually are he said:—"With regard to electrically-driven appliances I do not at present intend to spend much time on them, as unless the future is to bring us very radical changes there is no possibility of their being really widely used." We know that it is fashionable to ignore inconvenient facts, but if he would only take the trouble to make a few inquiries he would be really shocked to find how many electric wash boilers are in use. But we hope that he will continue to wear his rose-coloured blinkers after the war when we shall proceed with our steady march upon the wash boiler market.

Just Facts

WE hope that "Thermax" has read the paper by Mr. L. P. Ingram in the same issue. He, at least, has no doubt regarding the competitive strength of electricity. In fact he dismisses with impatience most of the stock arguments used by gas men when comparing gas and electric service. He says:—"No gas tariff provides the solution of the problem and if electricity can provide all the domestic services as cheaply and as efficiently as gas, we may be compelled to alter our whole conception of the industry."

Stabilised Insulators

MOST failures of high-voltage insulators in dirty and humid atmospheres are attributable to the overstressing of individual units that results from irregular distribution of potential throughout the string. It now rests with manufacturers to devise a practical means of incorporating within each unit a shunted stabilising resistance, which investigations at the insulator-testing station of the Central Electricity Board have shown to provide a cure. We trust that the concern as to the future of the station which was expressed by some speakers during the discussion of Mr. J. S. Forrest's I.E.E. paper is unfounded. About one-third of the mains in this country run overhead, and researches carried on in conditions that closely simulate the actual and provide a uniform reference basis are clearly valuable.

Overseas Members

A NOTE of permanent reality amid the horror of present events in the Far East is provided by the China Centre of the Institution of Electrical Engineers, which has continued to carry on its meetings and functions—a paper on distribution in Shanghai attracting an audience of seventy-one. Activities of overseas members generally are of growing importance and these members now constitute about one-fifth of the I.E.E. total. It is a happy omen that the authors of quite half of the papers presented in India were born in that country.

Patrol by Plane

THE most up-to-date method of patrolling overhead lines is surely that with which the North-western Electric Co. (Oregon) has recently been experimenting. A section of its line, over hilly country and suffering from heavy storms, is far from motor roads and seven men are required for eight hours to patrol the route on foot. The whole distance (110 miles for the double journey) can be covered by air in 65 minutes from the local airport, where a hired plane can take off at half an hour's notice. The nature and position of the fault can be ascertained quickly, it is said, and by means of two-way radio equipment immediate notification can be given to the maintenance gang.

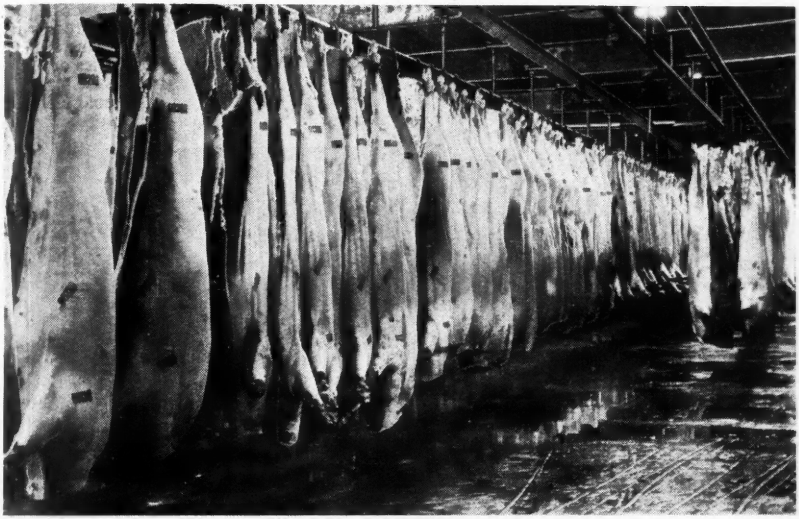
Generation Efficiency

RECENTLY we reported that the originally high overall thermal efficiency of Port Washington station (Wisconsin), which contains a single 80,000-kW generating unit operating on the reheat cycle, had steadily increased during its five years of operation, reaching 31.8 per cent. in 1940. Even better results are now declared for the first nine months of the present year, viz., 32.2 per cent. Steam conditions of 1,230 lb. per sq. in. and 825 deg. F. at the turbine stop-valve are not exceptional, so much of the outstanding performance is presumably to be attributed to the adoption of the one-boiler one-turbine principle.

Bacon Curing

How Electricity has "Mechanised" the Industry

CHARLES LAMB does not, as he did in the case of roast pig, enlighten us as to the origin of bacon, but at any rate we know that the history of curing and smoking, if not still more romantic, goes back at least for centuries. While, however, the actual processes employed to-day differ little from those used by our ancestors hundreds of years ago, the discovery of electricity has enabled the methods of undertaking them to be simplified and accelerated. The output per man in the bacon-curing industry has, in fact, been increased considerably through "mechanisation."



The hanging and trimming room

Being interested to see what part electricity was playing in the preparation of our "four ounces a week," we were recently privileged to visit a factory of the Co-operative Wholesale Society in Somerset, which has handled up to 1,600 pigs a week. Here Mr. R. A. Hales, the manager, systematically—though we are glad to say not too literally—carried out our suggestion "to pretend we are a pig" and take us right through the factory, from start to finish.

Coming to the factory either by road or rail, the pigs are put into sties holding a maximum of 400. From here they are taken as required to the adjoining catching and stunning pen, where by means of an "Iwel" electric stunner they are "put to sleep." This stunner has three contacts, two fitting on each side of the jowl and a third on the snout. Each contact is on a different phase of a 30-V, three-phase supply.

With a chain round one hind leg, the pigs are then raised by means of hooks inverted in a worm-type element (5-HP, 1,450-RPM motor) to a slightly inclined runway, where they travel by gravity to the bleeding passage. Here, brought to rest by a stop on the runway, they are stuck and bled, the blood flowing into a tank, then being blown over to the by-product department for treatment, and finally being dried into a powder. This and other by-products will be referred to later.

Still on the runway, the pigs pass along till another stop brings them to a standstill. An arm on a revolving "shield" (5-HP, 1,450-RPM motor) catches the hooks and lifts the carcasses up and over on to a projection on a vertical hoist, which lowers them slowly on to a rail where they slide gently into the scalding tank, large enough to hold ten pigs at a time. An operator, helped by a grid extending across the centre portion of the tank, keeps the carcasses immersed all the while in order to soften the hairs preparatory to depilation.

Timing of the processes is so arranged that

as two pigs enter the scalding tank, two others are lifted out by means of a " cradle " into the de-hairer. In this machine the two pigs, lying head to tail, have the hairs beaten off them by

A pig being lowered by the shield into the scalding tank

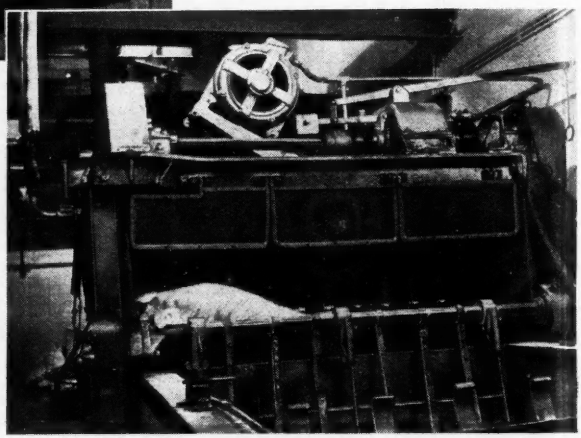
means of two rubber padded rollers revolving in opposite directions, warm water dripping on to the pigs all the time to keep the hairs soft. Driving the rollers is a 20-HP, 1,450-RPM motor mounted on the top of the machine.

As the cradle comes up with its load of two pigs, two treated carcasses are ejected on the other side of the machine, by means of a release gear on to the ejection table. "Gambrells" are then inserted in hind legs and the carcasses are raised by means of a worm hoist, similar to the one used in the stunning pen, up on to another inclined runway. A few yards along this, the pigs come to the singeing oven into which they go one at a time, an ingenious system of release catches arranging that as one pig leaves the oven another enters. This oven is composed of two halves which fit close together but are drawn apart to admit the pig. Jets of steam blow flame from sprays of burning oil on to a baffle plate which distributes the heat all round the fire brick interior and makes it white-hot. After leaving the singeing oven the pigs pass under cold water sprays to cool.

This treatment in the oven causes the skin, which after immersion in the scalding tank is white (no matter what its original colour may be) to become almost black. Accordingly they are scraped to render them white again. Butchers then open up the carcasses, remove the entrails, which are transferred by means of a chute to the entrails department below.

Passing on into the cutting-up room still on overhead rails, the carcasses are split and have their backbones removed. They are then examined, weighed, stamped with the factory licence registered number by a Ministry of Food official. They remain in the hanging hall until ready for trimming, after which they are transferred to the cold rooms, of which there are two, holding about 400 sides each.

The temperature in these cold rooms is maintained at 38-40 deg. F. by means of fans drawing cold air up through batteries of brine pipes connected with a refrigeration plant in the basement. Incidentally, it should be mentioned that the maintenance of temperature at

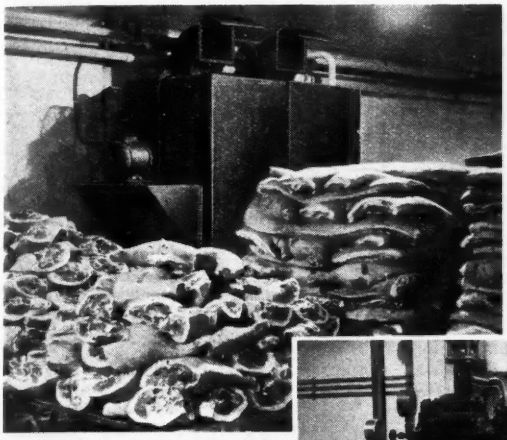


The de-hairing machine

the requisite levels is of the utmost importance throughout the process. Four fans are installed in each of the rooms, those in the outer or No. 1 room being larger and having 3-HP, 1,450-RPM motors; the smaller fans in No. 2 cold room are driven by 1½-HP 1,000-RPM units. These motors are fitted with Allen West starters.

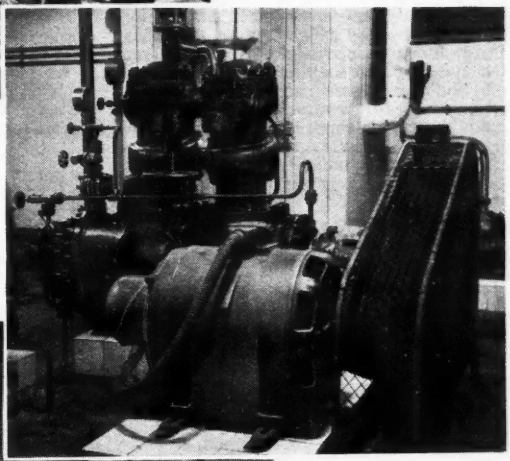
From the cold rooms the sides are transferred as required to the curing room, which is also maintained at a temperature of about 38-40

deg. F. by a cold air circulating system employing four fans of the same type as those used in No. 1 cold room. Here injections of brine are forced into the sides of bacon by means of Hamworthy and "Iwel" pumps arranged in duplicate. The sides are then placed in large tanks holding from 600 to 800 sides each, and covered with brine, this being pumped up from a storage tank in the basin by means of a centrifugal pump (Worthington-Simpson) driven by a 3-HP, 1,450-RPM motor. The brine goes through a filter tank to the storage tank. After the sides have been immersed in the brine for a certain period they are removed from the banks and placed on stillages and matured for a further period. The bacon is then ready for dispatching as green bacon.



One of the air circulating equipments in the curing room

If it is required to smoke the bacon, the sides are taken after curing *via* a worm hoist (3-HP, 1,450-RPM motor) to a drying room where two 3-ft. diameter fans (¼-HP motor) blow air at an atmospheric temperature around them. After this preliminary drying the sides are ready for smoking in double-tier stoves holding 400 sides at a time. The smoke is generated by means of smouldering sawdust, the time of smoking varying according to conditions. The sides finally go to the smoked bacon cooling room where two fans similar to those used in the drying room are installed. The bacon is then ready for use.



One of the Sterne compressors driven through V-belts by a 45-HP motor and (left) a three-tier oven, mixing machine and pastry roller in the small goods room

The refrigeration plant referred to comprises two Sterne " U.W." compressors of 30-ton capacity each, arranged in duplicate, a triple-pole change-over switch making it impossible for more than one machine to be used at a time. The motors are 45-HP, 1,440-RPM units which drive through V-belts. For the circulating water two Worthington Simpson pumps (3-HP, 1,450-RPM motors) are employed, also in duplicate, and two similar pumps circulate the brine. The motors in each case are controlled by G.E.C. starters. An agitator for stirring the brine is direct-coupled to a 1-HP, totally enclosed motor, running at 1,450 RPM.

By-Products

In bacon production there are, of course, a number of important by-products. Lard, for instance, is derived from the flares which, after cooling and weighing, go to a mincer (driven by a 3-HP, totally enclosed motor) and on to a steam-jacketed pan. While being worked on this the fat is kept in motion by an agitator which is driven by a 3-HP motor through a David Brown reduction gear. After boiling, the fat is separated, the pure lard being pumped off into a cold water jacketed cooling pan, while the grease remains; this residue comes out of the pan like cheese. For transferring the fat from one pan to another two pumps (11-HP motor) are utilised. Finally the lard is pumped into shapes ready for dispatch from the factory.

The heads, trotters, etc., are washed in a revolving cage (3-HP motor) and are then taken to the offal curing room where the atmosphere is cooled by three fans (1¼-HP motors) drawing cold air from the brine system. Automatic control of the temperature is secured by means of pressure float valve control.

The blood collected from the bleeding passage is boiled to get rid of most of the water and then passes on to a dryer, a rotary machine driven by an 8-HP motor. The surplus bones, etc., are passed to a melter (10-HP motor) which extracts most of the fat, a steam-operated rotary fat extractor finishing off the process. The residue after being ground in a disintegrator (10-HP motor) is bone meal, which like dried blood is much in demand for agricultural purposes as it is a valuable fertiliser.

Cooked Foods

Pies, sausages, cooked meats, etc., are made in the small goods department, the equipment of which comprises an " Iwal " mincer (20-HP motor), two hashers (7- and 8-HP motors), two " Iwel " sausage fillers (3-HP), a Baker Perkins pastry roller (3-HP), a Crypto mixer (1¼-HP), and a three-tier Baker Perkins pastry oven loaded at 16-kW per tier.

To provide the steam required in the various processes there are two Yate and Thom's marine type boilers (100 lb. per sq. in. pressure). The necessary water is brought from a 200 ft. deep well by means of a Worthington-Simpson pump driven by a 16-HP Crompton Parkinson motor.

The electricity supply for the factory comes from the North Somerset Electric Supply Co., Ltd., being transformed from 11-kV, three-phase, 50-cycles to 230/400 V by means of a 250-kVA Hackbridge transformer. Switching on the high-voltage side is done by Crompton Parkinson gear, the main circuit-breaker on the 400-V side being of Ellison manufacture. Simplex metalclad switch fuses are employed for the subsidiary centres. All the motors installed except where otherwise stated are of G.E.C. manufacture. The factory buildings were planned and designed by the Society's own Architect's and Building Department, under the direction of Mr. L. G. Ekins, F.R.I.B.A., and the engineering unit and technical equipment were planned and installed by the Society's Engineers' Department, under Mr. A. A. Scott, M.I.Mech.E.

The above is quite a brief account of bacon curing processing and it will be realised that since the war period drastic changes have had to be made in normal routine due to the changing conditions. However that may be, the bacon industry generally may be said to be playing its full part in the national cause.

Floating Power Station

OPERATIONAL results obtained from the generating plant aboard the *Jacoma* during the ten years since its installation are given in the *Electrical World*. Originally built as a cargo steamer of 5,238 gross tons, 396 ft. long by 53 ft. beam, the vessel was converted, at a cost about two-thirds of that of constructing a new land station, to supplement the output of the hydro-electric and steam plant of the Public Service Co., New Hampshire. The propelling equipment was removed to make room for two 10,000-kW turbo-alternators and four 280,000-lb.-per-hr. oil-fired marine type boilers.

Boiler steam conditions are 425 lb. per sq. in. and 700 deg. F. The 11-kV alternators are connected through Reyrolle switchgear, by means of armoured cables supported on steel towers, to a substation on shore, where the output is transformed to 66 kV.

During the decade the plant has generated 564 million kWh of the 2,361 million kWh produced or purchased by the company, of which fuel-fired plants are responsible for 639 million kWh.

Normally this floating power plant is run from Mondays to Fridays, inclusive. Availability has been 85 per cent. for the two units and the load factor has averaged 32 per cent. The hull is inspected by a diver each year and the boilers are overhauled at intervals of from six to twelve months. Twice in the ten years the vessel has been towed to dry dock, being away from her moorings for ten days and out of commission for overhaul for about three weeks in each case. Operating problems have been generally similar to those of an equivalent shore station. A staff of thirty-one is employed.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions

"Engineering—Unlimited"

I HAVE been greatly interested in the article under this title in your issue of November 7th. The suggestion that a maintenance organisation should be set up, which would be capable of dealing with every kind of engineering repair, is one which has interested me since long before the last war. At one time such an organisation seemed to be entirely feasible, but I do not think that it is so to-day.

I have found, from experience, that it is best for the maintenance contractor to employ selected craftsmen in the engineering and allied trades—machinists; electricians; winders; fitters; plumbers and pipe workers; carpenters; and builders' general hands. These men, having passed through a real apprenticeship, should be trained with year-in-and-year-out practice on maintenance work, to know how and when to take the stitch in time which saves breakdown.

Such a staff, under skilled technical direction, is indeed able to deal with all the maintenance problems which arise in a works which could posibly be dealt with by a resident staff. Indeed, they can do a great deal more, but it must always be part of the business of the technical staff to know when it is best to call in the help of the manufacturer or expert in any particular line.

Machines are now so specialised that frequently only the particular maker can deal with a particular failure. Further, this often applies to the various parts of a machine; the maker himself being dependent upon the specialist who has constructed the particular "gadgets."

I am quite satisfied, that all things considered, a works gets better and quicker service when dealing with a first-class firm of maintenance contractors experienced in the business in the way I have indicated, than is possible by the employment of "own staff." The maintenance contractors have the benefit of a wider and more varied technical experience and a greater variety of skilled labour, with the additional advantage of being able to call upon one man or a dozen or none at all, as occasion may dictate.

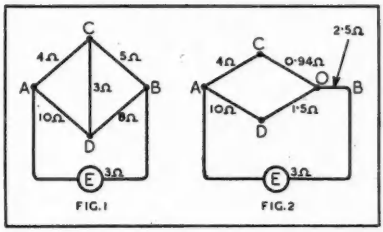
The bogey which is often advanced by works managers is the enormous loss which would accrue if the works were shut down owing to a failure which a man on the site perhaps would rectify in a few minutes. To this I would reply that, in the first place, no such shut-down has occurred in my experience of thousands of factories over a great many years. If it occurred it would be by reason of a fault which the resident staff could not remedy in a very short time. If a maintenance contractor found a works dependent upon a weak link which might shut down the whole place in case of failure, it would be his duty immediately to take such steps as were necessary to avoid such a possibility.

In my experience, breakdown calls very seldom involve stoppage of more than one machine and a skilled maintenance engineer, although he may have to travel half an hour to the job, will get the work done more quickly than anyone else, but the secret of good maintenance is correct diagnosis and the stitch in time.

*London, E.C.*1. H. MARRYAT.

Network Calculations

THE idea of injection of e.m.f. in the statement of Thevenin's Theorem given by Dr. T. F. Wall in his article on "Network Calculations" in your issue of November 7th, seems to me to be an unnecessary complication. The theorem is surely an expression of Ohm's Law for a particular case, and it might be more



simply conceived that an e.m.f. equal to the p.d. between A and B before the link is connected is available to drive a current round the circuit consisting of the impedance between A and B before the link is connected, plus the impedance of the link itself. No notice need be taken of any other e.m.f.'s in the circuit since they are already absorbed by the impedance drops in that circuit and since we are only concerned with the changes in current produced and not with the original currents.

The example worked by Dr. Wall (fig. 1—Dr. Wall's fig. 4) is capable of a much simpler solution than that afforded by Thevenin's Theorem. If the mesh BCD is replaced by an equivalent star network OB, OC, OD, we get the arrangement here shown in fig. 2, since $OB = \frac{DB \times BC}{DB + BC + CD} = \frac{5 \times 8}{5 + 8 + 3} = \frac{40}{16} = 2.5$. ohms and similarly OC = 0.94 ohms and OD = 1.5 ohms.

This is easily simplified to give a total circuit resistance of 8.95 ohms, hence a current of 11.2 A with an e.m.f. of 100 V in the conductor AEB. From the resistances of the parallel paths ACO, ADO the value of the current in AC = 7.8 A is easily calculated.

Hull. T. K. A. DOUGLAS.

Dr. Wall has seen a copy of Mr. Douglas's letter and replies as follows:—

The purpose of my short article was to give a statement of Thevenin's Theorem together with an outline of the principle involved. In considering how the very limited space which was available for the purpose could be best utilised, it seemed to me that a simple numerical example for which the solution could be obtained without difficulty by better known rules, as well as by this theorem, would be useful as a means of illustrating the method and enabling an independent check to be obtained on the result.

It is, of course, quite true that there is a large range of problems which can be solved in other ways more easily than by an application of this theorem; on the other hand, there is a wide range of problems for the solution of which this theorem is probably the most powerful tool available. Examples of its special value are the analysis of valve amplifier circuits and the distribution of short-circuit currents in electricity supply systems, whilst further examples of its important and comprehensive nature will be found in the *Archiv für Elektrotechnik*, Vol. XXX, 1936, page 754.

Sheffield. T. F. WALL.

Preserving Wood Poles

A CERTAIN amount of unimpregnated local timber is at present being used for light overhead lines in rural areas. Owing to the obviously limited life, such extensions are regarded as being of a temporary nature only. The butt ends of the poles are generally brushed over with creosote or soaked for a short time: the penetration in any case is little more than skin deep and rotting of the pole very soon commences at about ground level.

When recently discussing this problem, it occurred to me that the rot might be kept at bay for many years by bandaging the poles over a coating of preservative, the bandage itself being well soaked with tar after wrapping. The best results would doubtless be gained, particularly with poles having a rough or irregular surface, by bandaging over a thick bituminous or tarry mixture which would fill up all the crevices.

It would only be necessary to wrap sufficient of the poles surface to extend some 6 in. below and, say, 12 in. above surface level. The end of the bandage, which might be made of almost any scrap material (old curtains for example) could be tacked to the pole to prevent unwrapping. It should take but very little time to do the job and would, I believe, be well worth while.

With regard to poles which are already badly rotted, Mr. H. Wilson, of Ashford, informs me that he has given a number of poles in this condition a new lease of life by providing them with a thick concrete collar cast around the pole and extending some distance below and above ground level.

Twickenham. R. D. REYNOLDS.

Elimination of Glare

IN his article on "Industrial Lighting," in the issue of the REVIEW dated October 10th, Mr. E. B. Sawyer refers to the absence of any accepted quantitative standard by which to measure the effect of various lighting systems in the matter of glare. I am not a student of the art of lighting, nor an expert in photometry and I may be somewhat of a crank in this matter of glare, but as I have never seen any published effort to express the glare factor quantitatively, I propose to try to express it myself and make the following suggestions:—

(1) That an effort be made to improve the standard of lighting by the elimination of glare.

(2) That a reward be given to lighting arrangements or installations in which the glare is either significantly reduced or entirely eliminated, by assigning a "glare factor."

(3) That the glare factor should be considered as a figure of merit, maximum value unity corresponding to a system in which glare is entirely eliminated (this system would correspond to cases where the required field is illuminated entirely indirectly).

(4) That this figure of merit—glare factor—should be expressed as the ratio of the minimum to the maximum light intensity at any object (including the illuminant) within the field of view.

It will be seen that the factor cannot be assigned without establishing the viewpoint, that is to say, the standard is subjective. However, as all but merely "decorative" or "advertisement" lighting is an aid to vision, it is not unreasonable to consider the point of view of the person who has to do the seeing.

Glare is to be avoided not only because it "worries" the viewer and makes the lighting effect unpleasing, but because there is a measurable loss in light value in schemes where glare is present since the human eye accommodates itself to any lighting arrangement by partially closing the iris—stopping down, camera fashion, till the brightest objects within the field of view stop worrying it. No such stopping down occurs in the absence of glare and accordingly I propose a figure of merit of unity or 100 per cent. for this condition.

I helped to design a system recently for the illumination of a control room where it was possible for the whole of the lighting to be in a central position corresponding to that of the control operator so that the lights used were

entirely out of the field of view for his practical operations. I understand that our primary object in avoiding glare was entirely successful.

A little juggling with the law of inverse squares shows that my proposed glare factor can be otherwise roughly expressed as :—

$$\sqrt{\frac{\text{distance from light source of diffusing plane.}}{\text{distance from light source of working plane.}}}$$

The obvious effect of the use of this figure of merit would be to penalise systems using small-size diffusing surfaces. The diffusing surface for instance for a " naked filament " ought to be measured on the basis of the size of the coil giving a corresponding figure for distance from light source of diffusing plane of about 3/16 in. I feel so strongly on this matter of the use of lamps with naked filaments that I would cheerfully subscribe to legislation prohibiting their manufacture and sale because in my experience in nine cases out of ten of the naked filaments which I have seen in use, a pearl or opal lamp would be a far more effective illuminant.

As an illustration to press my point, I could cite many cases in which it would be possible by use of a larger size diffusing bowl, for instance, actually to reduce the illumination intensity in foot-candles and yet to improve lighting from a physiological point of view and, therefore, to make it more effective. Lighting should be judged by some such standard which expresses not mere photometric value only, but preferably its value to see with.

Weybridge. C. J. GRIMWOOD.

PERSONAL and SOCIAL

News of Men and Women of the Industry

IT is announced that **Mr. F. H. Sharpe** (formerly at the London Office of Merz & McLellan) has been appointed local hon. secretary of the Institution of Electrical Engineers for India as from January 1st, 1942, following the retirement of **Mr. S. W. Redclift,** of Calcutta, Electrical Adviser and Inspector to the Government of Bengal.

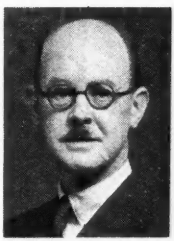
Dr. J. L. Miller, M.I.E.E., M.Amer.I.E.E., by arrangement has resigned his position as chief research engineer to Ferranti, Ltd., and is joining British Insulated Cables, Ltd., as deputy chief engineer. Dr. Miller was educated at Liverpool University, and after receiving the Ph.D. degree in 1925 for post-graduate research, joined the Metropolitan-Vickers Electrical Co., Ltd., as a college apprentice, being eventually appointed to a post in the motor design (general engineering section) department. He then took up a position with Ferranti, Ltd., as head of the high-voltage laboratory, where he became established as a research worker in the insulation, transformer, high-voltage, transmission line, transient, high-speed oscillographic and surge absorber fields. In 1937 he began to be additionally interested in other aspects of Ferranti's activities, particularly in the electronic and physical branches, eventually taking charge of these particular research laboratories.

Dr. J. L. Miller

Recently, Dr. Miller became associated with the radio and other departments of Ferranti, Ltd., and in due course he was appointed to the new post of chief research engineer, with the duties of facilitating the more centralised direction of Ferranti research and development and collaboration with Government Services.

Dr. Miller, either alone or in collaboration with his colleagues, is the author of papers which have been published in various technical journals in this country and abroad. In 1932 he was awarded the Institute of Physics Laboratory Prize, and in 1934 and 1938 respectively the Paris Exhibition and the Sebastian de Ferranti Premiums of the I.E.E. For his various published contributions the degree of D.Eng. was also conferred upon him by Liverpool University in 1934. Dr. Miller has twice been a member of the Committee of the North-Western Centre of the I.E.E., and is at present joint leader of the post-war planning sub-committee of this Centre on fundamental research. He is at present associated with several other research committees and in the past has attended numerous research conferences abroad.

Mr. F. Warburton Taylor, M.Sc. (Tech.), A.M.I.E.E., Mem.A.I.E.E., has been appointed to succeed Dr. J. L. Miller as chief research engineer of Ferranti Ltd. Mr. Taylor was educated at the College of Technology, Manchester, and joined Ferranti Ltd., in 1922 as a transformer designer. In 1925 he took charge of the high-voltage section and was engaged in the development of high-voltage testing transformers, impulse and high-frequency generators up to one million volts, as well as high-voltage DC generators for cable testing, X-ray work and electrostatic deposition. Since that time he has been responsible for the design and installation of the many high-voltage testing laboratories which the company has carried out. In recent years he has been connected with radio-transmission work, and has been responsible for the development of high-power audio-frequency equipment used in broadcasting.



Mr. F. W. Taylor

Professor Willis Jackson (Manchester University) and **Professor S. Parker Smith** (Glasgow Technical College) have been nominated to serve

as representatives of the Institution of Electrical Engineers on the Engineering Joint Examinations Board in place of **Professor C. L. Fortescue** (City and Guilds College, London) and **Professor R. O. Kapp** (London University), who retired from the I.E.E. Council in September last.

The Leicester Corporation Electricity Committee proposes that the salary of the chief electrical engineer, **Mr. John Mould,** shall be increased from £1,800 per annum to £2,000, with further increments of £100 until the schedule salary is reached. Mr. Mould's salary, based on the output for the financial year ended March 31st last, would be £2,371 per annum.

Mr. E. H. Skinner, assistant borough electrical engineer of Colchester, has been appointed flying officer in the Colchester Squadron of the Air Training Corps.

Mr. A. Murray Coombs, M.I.E.E., wishes to express his gratitude for visits and letters at Charing Cross Hospital since his accident. He is now at Ashridge Hospital, Berkhamsted.

We are glad to hear that **Mr. A. H. Todd,** the borough electrical engineer, Clitheroe, is progressing favourably after an attack of blood poisoning.

Dr. M. R. Youssef, Professor-designate of Marine Engineering at the Fouad I University, Cairo, whose paper on "Wind Tunnel Experiments on Model Reaction Turbine Blades" is summarised in our Institution Proceedings section this week, served his apprenticeship and gained practical experience with Carron Company, the National Gas Engine Co., G. & J. Weir, Ltd., and Barclay, Curle & Co. He graduated B.Sc. in engineering at Glasgow University in 1923, and subsequently received the degrees of Ph.D. and D.Sc.

After working as costing and estimating officer in the Egyptian Customs Administration he became, in 1936, Inspector of Technical Education in Egypt and was also an external lecturer in machine design to the Fouad I University.

The many friends of **Mr. J. L. Ostick,** mains superintendent, Finchley, will learn with regret that continued ill-health has made it necessary for him to retire on superannuation from that post which he has held for many years.

Mr. Norman L. Ablett has been elected chairman of the Junior Institution of Engineers and Messrs. H. S. Rentell and J. Calderwood, vice-chairmen. Mr. H. G. Pusey is hon. treasurer, while members of Council are Messrs. L. S. Atkinson, J. E. Gray and R. W. Winterborne, with Mr. A. J. Gatrill as junior councillor.

Obituary

Dr. W. Nernst.—The death is reported from Berlin at the age of seventy-seven of Dr. Walther Nernst. Dr. Nernst studied in the Universities of Zürich, Berlin, Graz and Würzburg, and while at the latter University he devoted himself especially to the investigation of the Hall effect and thermo-magnetic currents. In 1897 he found that various earths, although practically non-conductors at ordinary temperatures, conducted exceedingly well at higher temperatures. He discovered that magnesia acted in this manner besides being capable of resisting high temperatures and possessing a high emissivity for light and from this the Nernst electric glow lamp was developed.

Mr. W. Preston.—We regret to report the death, on November 22nd, of Mr. William Preston, J.P., managing director of Wm. Sanders & Co. (Wednesbury), Ltd., the switchgear manufacturers. Mr. Preston, who was sixty-seven, was educated at the Walsall Grammar School and Weston School, Bath. From 1924 to 1929 he was Conservative M.P. for Walsall.

The late Mr. E. H. A. Richardson

Mr. E. H. A. Richardson.—We regret to announce the sudden death at Bristol on October 30th, of Mr. Edwin H. A. Richardson, managing director of Associated Electric Vehicle Manufacturers, Ltd. Mr. Richardson had been managing director of the company since its incorporation five years ago and was largely responsible for its formation. Prior to this he was actively connected with the electric vehicle trade for several years.

Mr. J. Insull.—The *Electrical World* reports that Mr. Joseph Insull, brother of the late Mr. Samuel Insull, died on October 12th at his home in Springfield, Mass., after a long illness. His age was 83. He was born in London and spent most of his life in the electrical manufacturing field. From 1903 to 1928 he was assistant general manager of the American General Electric Co.'s Pittsfield plant. He retired in 1928.

Dr. F. Eichberg.—The death occurred recently in the United States of Dr. Friederich Eichberg, consulting and research engineer for the Stinson division of the Vultree Aircraft Corporation's Wayne (Michigan) plant. Dr. Eichberg, who was born in Vienna in 1875, joined the A.E.G.-Union Electric & Manufacturing Co. of Austria and Germany in 1899 as consulting engineer and manager of the railway department. He became manager of the company in 1921 and a member of the board of the A.E.G., Berlin, in 1926. He went to America in 1938. He took out several patents, among them being the Winter-Eichberg single-phase railway motor.

Waste-paper Salvage

THE essential nature of waste paper in the production of munitions is our reason for urging upon our readers once again the necessity for swelling the collection of waste paper which is now pouring in.

It has been pointed out that one ton of paper can be converted into 1,500 shell containers, 9,000 shell fuse components, 11,000 mine assemblies, 71,000 dust covers for aero engines, 36,000 cut-out targets, or 3,000 boxes for aero-cannon shells. At present a large part of the requirements is imported from America; the shipping saved by relying on home resources could be very usefully employed in other directions.

Readers are asked not merely to have one glorious clear out but to make a sustained and regular collection of all paper as it becomes "waste." Waste paper must not be wasted; it is vitally important.

Power Factor

By G. F. Freeman,
M.Sc., A.M.I.E.E.
(West Ham Municipal College)

The author gives further attention to some points raised by Professor G. W. O. Howe in a recent article on the subject

THE various interpretations given to the terms "apparent power" and "power factor" in an unbalanced three-phase system have recently been comprehensively summarised by Professor G. W. O. Howe.* Of the six possible definitions given, three lead in practice to the same values, so that we are left with four possible alternatives for the apparent power, (a) the "arithmetic" value, (b) the "vector", "algebraic" or "regulation" value, (c) the "limiting" (single-line) value and (d) the "equivalent balanced copper-loss" value. From these derive corresponding figures for the power factor, the true power being of course unique to the load combination, as is also the *net* reactive demand. For a detailed explanation of the terms the reader is referred to the article mentioned and subsequent correspondence.† There are, however, certain aspects which invite further attention.

Algebraic apparent power, as postulated by Curtis and Silsbee,‡ is a quantity that is a little hard to visualise. An alternative method of approach may perhaps help to make the idea clear.

Suppose a given star load combination to be supplied by a star system of three coupled single-phase generators as in fig. 1a. The vector relationships are shown in fig. 1b (phase sequence 1, 2, 3) on the assumption that the line voltages are balanced at 173 V each. Individual load voltages V_1, V_2, V_3 star at 0, from which it follows that the actual load kVA are 4·50 (p.f.1), 2·30 (p.f.0 lag) and 0·80 (p.f. 0 lead) respectively, so that the *net* demand is 4·50 kW and 1·50 lagging kVAR.

The *generator* star potential is O′, and it is clear that by suitable adjustment of excitation and coupling angle O′ may be located anywhere. At one particular position, however, the phase angles of all the generators are identical; this is the position shown in the figure, and the respective outputs are 1·035, 1·715 and 1·995 kVA at a lag angle ϕ of 18·45 deg. The total output is thus 4·745 kVA, and *this is the algebraic apparent power.* The cosine and sine components are 4·50 kW and 1·50 lagging kVAR, in agreement with the net demand of the load. The algebraic power factor ($\cos\phi$) is 0·95 lagging.

By the vector method, the positive sequence components likewise give 4·50 kW and 1·50 lagging kVAR, the negative and zero sequences contributing nothing since they have no voltage components. There is however 5·5 A negative sequence current, which in practice would react with the circuit impedances to unbalance the voltages.

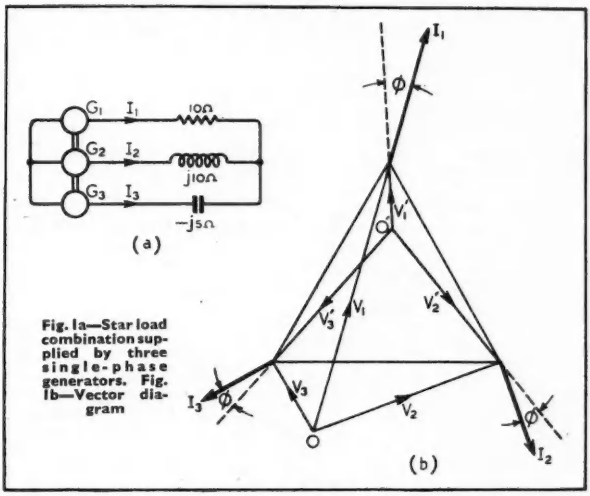


Fig. 1a—Star load combination supplied by three single-phase generators. Fig. 1b—Vector diagram

The algebraic definition does not appear to provide for a four-wire system, but the generator conception may readily be extended to take account of the fourth wire. This has been done for the circuit of fig. 2a, and in the vector diagram of fig. 2b it has been supposed that the voltages have become unbalanced by the loading, so that their star magnitudes are, in sequence, 100, 90 and 110 V, and the angles, 115, 120 and 125 deg., which is qualitatively

* ELEC. REV. 3.10.41. p. 323.
† Ibid. 17.10.41 & 31.10.41.
‡ *Electrical Engineering* (U.S.A.), v. 54, 1935, p. 400.

correct for this type of loading, taking the line impedance to be mainly inductive.

The load star point O is now stabilised by the neutral, and the generator star point O′ is selected so that the three *line* machines as before, work at the same phase angle ϕ. It now happens, however, that whilst G_1 is still generating, G_2 and G_3 are motoring, as the vectors show. (Compare Curtis and Silsbee's remark that in starring resistances to obtain their equivalent neutral, one or more of these resistances may be negative.) The fourth machine G_0 is necessary to generate the potential difference between O and O′; its phase angle ϕ_0 bears no constant relation to ϕ, and the total apparent power is obtained by summing vectorially the kVA outputs of $(G_1 + G_2 + G_3)$ and G_0, regarding these as two power units feeding the load in series.

In the example, ϕ is 34·75 deg. leading, and the line machines give + 2·62, −1·785 and −0·825 kVA respectively, totalling + 0·01 kVA, the components being 0·01 kW and 0·005 leading kVAR. The neutral machine G_0 gives 1·18 kVA at 33·15 deg. leading, components 0·99 kW and 0·645 leading kVAR. The total supply is thus 1·00 kW and 0·65 leading kVAR, which agrees with the demand (1·00 kW, 1·26 leading and 0·81 lagging kVAR, net 0·65 leading kVAR).

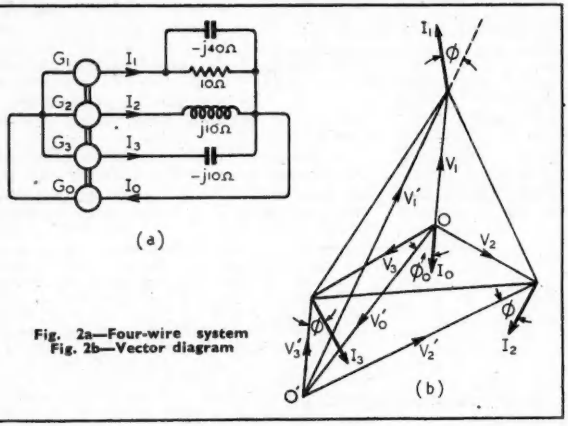


Fig. 2a—Four-wire system
Fig. 2b—Vector diagram

The vector method here gives :— positive sequence, + 1·01 kW, + 0·39 leading kVAR; negative sequence, − 0·01 kW, + 0·24 leading kVAR; zero sequence, 0 kW, + 0·02 leading kVAR; totals, 1·00 kW and 0·65 leading kVAR as shown before.

It will be noted that when, as in this case, the voltages are unbalanced, the positive sequence components do not tell the whole story, although mainly responsible for the "regulation" power factor; the discrepancy, however, is usually of small practical importance.

The power factors for these two circuits have been worked out by all four methods, the results being given in round numbers in Table I (circuits 1 and 2). For methods (c) and (d) it has been assumed that all wires are of the same section. For circuits 1R and 2R the same components obtain, but the load sequence has been reversed by interchanging lines 2 and 3.

Circuits 3 and 4 are simple single-phase resistance loads on three-wire and four-wire (line-to-neutral) systems respectively; sequence here is immaterial. The last six circuits styled "A" are the result of combining a 10 per cent. load, unbalanced as in the earlier examples, with a 90 per cent. balanced load at 0·8 lagging p.f.; the percentage is taken on the total kW and the voltage unbalance of circuit 2 reduced in proportion.

While precise quantitative conclusions require a much more extensive examination than that attempted here, including a discussion of impure wave forms, the following suggestions may be offered for consideration:—

(1) Since without a load there can be no useful power, it is thought proper to relate the power factor to the *load* primarily, rather than to the *line*. Accordingly, definition (b) is regarded as the most logical. So long as the *net* kW and kVAR demands are found, by any method, the *load power factor* is thus completely determined.

TABLE I

Circuit	P.F. by definition			
	(a)	(b)	(c)	(d)
1	0·915	0·95 lag	0·71	0·895
1 R	0·43	0·95 lag	0·315	0·415
2	0·33	0·84 lead	0·305	0·305
2 R	0·33	0·84 lead	0·12*	0·175
3	0·865	1·00	0·575	0·705
4	1·00	1·00	0·335	0·41
1 A	0·815	0·815 lag	0·795	0·815
1 RA	0·81	0·815 lag	0·72	0·805
2 A	0·825	0·84 lag	0·745	0·81
2 RA	0·825	0·84 lag	0·745	0·765
3 A	0·83	0·83 lag	0·77	0·825
4 A	0·83	0·83 lag	0·725	0·815

*On neutral current

(2) From the point of view of the heating of multi-core feeder cables and star-connected generators, definition (d) is important. The apparent power by this method is obtained quite simply by Howe's formula as $V_L\sqrt{I_1^2+I_2^2+I_3^2+I_o^2}$ where V_L is the line voltage (take mean value if slightly unbalanced). The neutral current is zero on a three-wire system, and should be omitted when a generator only is being considered.

(3) Where severe current magnitude unbalance exists on single-core lines, (c) should be considered. (Apparent power $\sqrt{3}V_L I_m$, where I_m is the largest current in any line). This condition may however be regarded as abnormal.

(4) The popular arithmetic method (a), which has the least theoretical justification, is fairly satisfactory provided the unbalance is small, but cannot be relied on in extreme cases, particularly if the characteristic reactive demand of the unbalanced components is of opposite sign to that of the balanced loading (usually lagging). The examples reviewed lend support to the view that metering systems depending on this definition will usually give acceptable indications.

(5) If suggestions (1) and (2) find favour, the terms *load power factor* (by (b)) and *line power factor* (by (d)) might be connected by a ratio which ordinarily would not differ greatly from unity, and which would express the "goodness" of the balance. Both these power factors have a bearing on the equity of a maximum demand tariff, the exact nature of which would have to be worked out with a full knowledge of the relevant costs. In any event, the very existence of the two figures would bring home to the consumer the advantage of balancing his load.

The writer is greatly indebted to the stimulating influence and encouragement of Professor Howe. No responsibility of course attaches in respect of any opinions here expressed which may be regarded as controversial, but it will be realised that there is a great deal of common ground, and in the main the earlier precepts form the basis of the present study, although the emphasis may not be entirely the same.

I.M.E.A. Activities

Rationing Scheme to be Prepared

TWO new centres of the Incorporated Municipal Electrical Association are being formed for the Central England Area and the South-West England and South Wales Area, both of which are identical with the corresponding areas of the grid system.

Fuel Economy

Interviews with the Mines Department by the National Gas and Electricity Committee have shown that in spite of an improvement in the coal situation, the Government insists that a scheme for rationing gas and electricity must be prepared ready to put into operation should it become necessary. The Committee is of the opinion that if a rationing scheme has to be introduced it should be based upon that put forward at the beginning of the war, in spite of its many failings. It has appointed representatives to a joint committee set up by the Mines Department to prepare a definite scheme.

In reporting the matter the *I.M.E.A. Journal* refers to the twenty-fourth report of the Select Committee on National Expenditure in which the subject of fuel economy was dealt with (*vide* ELECTRICAL REVIEW, November 7th).

Coal Wagon Demurrage Charges

When the Demurrage Orders were made by the Ministry of Transport public utility undertakings were assured that in the case of genuine difficulty demurrage would not have to be paid. At a recent meeting of railway representatives and a delegation from the Conjoint Conference of Public Utility Associations the railways adopted the attitude that they must adhere strictly to the terms of the Orders. The Conjoint Conference representatives pointed out that nowadays coal was "directed" to undertakings irrespective of their contracts and in such an irregular manner as to make it impossible to clear the wagons in the prescribed period.

The railway companies agreed that particular cases should be discussed in the first place with the local district goods manager and if any difficulties arose they should be referred to the Conference with a view to a further meeting with the railway companies.

Price Adjustment Clauses

As we reported in our issue of October 24th, the I.M.E.A. Council, as a result of representations made by members, decided to rescind its decision to approve a formula prepared by B.E.A.M.A. for the application of price adjustment clauses. The subject has been discussed by the I.M.E.A.-B.E.A.M.A. Joint Committee and various suggestions have been submitted to B.E.A.M.A. which are now being considered with other electricity supply associations.

War Risks Insurance

The Board of Trade decided some time ago that when goods being supplied for an order are "affixed" to the purchaser's premises they cease to be insured under the War Risks

Insurance Act, 1939, and become subject to the provisions of the War Damage Act, 1941.

In discussions with the British Electrical & Allied Manufacturers' Association the Board has agreed that it is not always possible to define the term "affixed" and the manufacturer must therefore decide in each individual contract when, in his opinion, the goods have become "affixed." The B.E.A.M.A. Council feels that so long as there is a clear understanding on this point between the manufacturer and the purchaser no difficulties need arise, and it accordingly recommends members themselves to insure all goods being supplied by them under an erection contract up to the time they are taken over by the purchaser; that is to say, up to the taking-over date under I.E.E. or I.M.E.A. Conditions. They are asked to notify the purchaser that as from the taking-over date they accept no responsibility in respect of war damage and that the liability to insure the goods has passed to him.

INSTITUTION PROCEEDINGS

Insulator Investigations. *Turbine Blade Design.*

Testing Porcelain Insulators

OPENING the discussion on Mr. J. S. Forrest's paper, to which reference was made last week, on "The Characteristics and Performance in Service of High-voltage Porcelain Insulators," at the INSTITUTION OF ELECTRICAL ENGINEERS, London, on November 20th, Mr. C. W. Marshall (Central Electricity Board) said that the paper was an admirable summary of some ten years' work carried out by the author on behalf of the C.E.B. Although the testing had been done at normal voltage, the object being to learn what the insulators would do in service, he felt that testing at higher voltage would greatly accelerate the process of determining the best form of insulator, a problem which had by no means yet been solved. The stabilising of the voltage distribution was the biggest positive contribution made by this investigation, and the provision of a practical means of ensuring that each unit took its share, and only its share, of the voltage, was a really important investigation which, if satisfactorily concluded, would almost entirely eliminate flashover troubles.

The author had been somewhat summary in his dismissal of surface resistivity; although the geometrical investigation needed was tedious, it was worth while. The most economical anti-fog unit under present conditions was the inclined disc type, with the inclination produced simply by kinking the pin of each insulator to a certain degree.

Application to Glass

Professor W. J. John expressed regret that the word "porcelain" had been so definitely associated with this paper, as much of the technique, and many of the test results were equally applicable to glass insulators. The instrument devised by the author for measuring the voltage distribution over insulators was extremely neat and simple, but what was wanted was an indication of the voltage distribution when the measuring device was not there. If the author's device was meant to detect abnormality in distribution that should be made clear. Just how useful did the author consider his device for measuring distribution from place to place, over the sheds of the pin type porcelain insulator, for instance?

The "live stick" tester only showed up seriously damaged bushings, whereas the Schering bridge method might enable one to do something to prevent bushings from deteriorating further. The use of leakage distance as an indicator of the likely performance of an insulator under fog conditions was dangerous. Personally, he thought the surface resistance coefficient was definitely better. However, it was unnecessary to specify either, for if an insulator was to be used under fog conditions, it should be tested with equivalent humidity so that in a specified time the number of surges did not exceed a certain figure.

The Croydon Testing Station

Mr. G. H. Halton said that, while possibly the author might consider his original problems solved, it was to be hoped that some means would be found for keeping the Croydon testing station available for investigation from the points of view of the user and the manufacturer. The Central Electricity Board should be willing to sponsor the work. It was shown very clearly in Table 2 that the tension insulator, although it had quite a low creepage value, was very definitely the best and he wondered whether it was not possible to make more use of the fact that insulators erected in the horizontal position were very efficient under fog conditions. No attempt should be made to specify designs by laboratory tests, which must be regarded as a means for the maker to check his manufacture rather than his design.

Dr. S. Whitehead said he understood that the object of the potential distribution test was to enable insulators to be found which were so inherently faulty that they would probably break down in normal service, whereas the main employment of the leakage tests was to compare type designs and to

determine the intervals of cleaning. Although he agreed, in the main, with the author's description of the mechanism of failure, one or two revisions were desirable. For instance, a crack of molecular dimensions of itself did not initiate a discharge, but a spot of molecular dimensions might form a nucleus for discharge if corona were already present in the ambient air. It was not a question of a crack, but of a spot capable of providing electrons.

Dr. H. W. Clark, expressing the hope that Mr. Forrest would continue to publish results from time to time, since such tests must be carried out on a fairly large scale and they occupied a long time, which meant that it was not possible for others to make tests for themselves. He asked whether tests carried out at a single location gave a complete answer. It was pleasing that Mr. Forrest did not place too much reliance on the results of flash-over tests. Specifications calling for high wet flash-over voltage were not good. It was better to specify a simple criterion such as leakage distance rather than surface resistance coefficient, although neither of them was complete.

The oil-filled insulator seemed to have marked advantages, and he wondered whether it gave so good a performance because deposits, and particularly moisture, settling on the oiled surface sank to the bottom. In that case possibly it would be quite important to provide ribs to prevent a conducting path forming underneath the oil around the porcelain.

Atmospheric Pollution

Mr. J. F. Shipley said the paper was filled with common sense and illustrated the extent of atmospheric pollution. In Warsaw the best conditions were 19 particles of dust per c.c.; in Melbourne 23; in Athens 40; in a village near Stockholm from 40 to 120; in Washington on a rainy day 59; and in London 300. In order to arrive at the worst conditions, those figures must be multiplied by 25, 50 or 100, or, in the case of London, by 200. .The maximum of 60,000 particles per c.c. in London was noted during one of the blackest fogs.

Mr. W. A. A. Burgess agreed that the wet test was harsh, suggesting that it might be supplanted by creating a steamy and dusty atmosphere. Mr. H. W. Taylor, referring to the suggestion that the percentage deterioration was likely to be 0.1 per cent. per annum, presumed that that was not a flat rate. His experience with toughened glass insulators had been good; parts of 360 miles of line fitted with such insulators had been in operation for 3½ years, not one of them having been replaced.

Mr. Forrest, replying, said he was still unrepentant with regard to surface resistance coefficient since variations of surface resistivity were enormous; on an ordinary insulator unit it could vary from 100,000 megohms on a fine dry day to half a megohm in a fog. The part of the paper dealing with the surface characteristics of porcelain insulators could be applied as it stood to glass, because the surface of glazed porcelain was glass. Professor John's criticism was a little hard, for the electrostatic voltmeter device described did measure the distribution with ample accuracy for the purpose, since the paper was concerned with distribution on insulators which were not so dry and clean. Schering bridge tests were made on bushings, but that was beyond the scope of the paper. The text book theory of potential distribution should be scrapped, and a very much simpler one substituted.

Retention of Test Plant

It was hoped to continue to use the 85 kV testing equipment, and he believed it would be a permanent institution at Croydon. There was less damage on tension strings, due to arcs, than on suspension strings. Some tests were being made on other sites, in some cases near the coast, but there were no results to be reported yet.

He believed the good performance of oil-filled insulators was due to the fact that the deposits sank to the bottom, and the ribs shown on the experimental design, although present in any case, probably were useful in that respect.

The 0.1 per cent. per annum deterioration represented an upper limit, and it was often as low as 0.001 per cent. per annum for good types of insulators. It was not a linear function of time. An artificial pollution test was needed, and steam would probably be very useful for that purpose, given careful control. It was not the intention to use stabilising resistance on bushings at present.

Sir Noel Ashbridge, the President, proposing a vote of thanks to Mr. Forrest, said he hoped the work described would be continued. Special insulators had had to be used for broadcasting aerials, for the problem was complicated by the higher frequencies; satisfactory insulators could be obtained in this country for that purpose.

Turbine Blade Experiments

WIND tunnel experiments with model reaction turbine blades was the subject of a paper presented to the NORTH-EAST COAST INSTITUTION OF ENGINEERS AND SHIPBUILDERS at Newcastle-on-Tyne on November 14th. The author is Dr. M. R. Youssef, professor designate of marine engineering at the Fouad I University, Cairo, and in reading the paper on his behalf Dr. T. W. F. Brown explained that hitherto no theory had been investigated that was capable of clarifying fully the effects of such blade factors as number, angle, pitch and breadth, upon the action of machines of this kind.

Many experiments had been made to determine the optimum circumferential pitch for a given blade pitch, mostly aimed simply at empirical derivation of the best efficiency, without inquiry into other factors. Practical application of hydrodynamics and aerodynamics to turbines, pumps, fans and compressors stimulated inquiry about the extent to which knowledge of aerofoil mechanics was applicable to reaction steam turbines. There were certain analogies, with fundamental differences as well as similarities, between aeroplanes and turbines in that the efficiency of both ultimately depended upon the behaviour of a mass of fluid moving rapidly over curved surfaces. Wings and blades reacted in much the same way on the fluid flowing past them and they experienced pressure due to similar causes.

From the author's experiments with model blades (supplied with other parts of the apparatus by G. & J. Weir & Co., Ltd.) it appeared that if any increase of the pitch were desirable it should be given equally to both the fixed and moving blades. The conclusion of the whole matter seemed to be that, although the performance of each individual blade might be improved by keeping it so far from its neighbours on either side that they could not disturb the flow round it, this desirable state could never be attained without allowing a considerable portion of steam to pass through the blading without yielding up its energy.

Earth-Leakage Protection in Mines

A PAPER on AC earth-leakage protection in mines was read recently by Mr. H. Coulter, chief electrical engineer of the Alloa Coal Co., to the Lothians Branch of the ASSOCIATION OF MINING ELECTRICAL AND MECHANICAL ENGINEERS at Edinburgh. He showed how the installation of accepted protective devices would be advantageous to output by decreasing major breakdowns of plant and limiting damage when breakdowns did occur. The greatest benefit was the measure of increased safety afforded throughout the system from the surface to the coal face, and the accident risk to personnel would be considerably reduced.

Lighting Practice

ILLUMINATING engineering was of such wide scope as to merit specialised study of the research and investigation constantly being carried out, said Mr. J. B. Harris in a paper which he presented recently to the Western Centre Students' Section of the INSTITUTION OF ELECTRICAL ENGINEERS at Bath.

Commencing with a review of light sources and controlling equipment, the author went on to compare the relative efficiencies of discharge and filament lamps and contrasted their average lengths of useful life. Visibility was the main criterion in road lighting, for which purpose he said sodium lamps were being increasingly used. It seemed that the colour correction of mercury-vapour lamps would most successfully be done by coating the inside of the lamp with fluorescent paint, as was being done to a great extent with cold cathode discharge lamps.

The advantages of low-voltage mercury discharge "daylight" lamps, coated with fluorescent powder, were enumerated and demonstrated, the author remarking that progress in America had been somewhat more rapid, making such lamps available there in a wide range of sizes and colours for use in all types of interiors, especially those of a domestic character.

The greater attention now being devoted to the lighting of offices, industrial premises and streets was indicated, the last mentioned being a very controversial subject indeed. The scope of floodlighting both decoratively and commercially for advertising as well as for industrial work at night, such as in dockyards, was referred to before the author turned in conclusion to some of the many and varied applications of fluorescent paints for display purposes in theatres and shops, trick effects, invisible laundry marking, food examination, philately and similar utilitarian identification purposes.

Forthcoming Events

Institution of Electrical Engineers.—Thursday, December 18th, 4 p.m. London. Paper: "Voice-frequency Signalling and Dialling in Long-distance Telephony," by Messrs. W. G. Radley and E. P. G. Wright.

Wireless Section.—Wednesday, December 3rd, 4 p.m. London. Paper: "Transmission Characteristics of Asymmetric Sideband Communication Networks," by Mr. E. Colin Cherry.

Meter and Instrument Section.—Friday, December 5th, 4 p.m. London. Paper: "Maximum Demand Metering: a Study of the Timing and Length of the Integration Period," by Mr. D. J. Bolton.

Transmission Section.—Wednesday, December 10th, 3 p.m. London. Paper: "Measurement of Lightning Voltages and Currents in Nigeria," by Messrs. F. R. Perry, G. H. Webster and P. W. Baguley.

Installations Section.—Thursday, December 11th, 4 p.m. London. Paper: "Rationalisation of Colliery Electrical Equipment," by Mr. J. A. B. Horsley, O.B.E.

South Midland Centre.—Monday, December 1st, 6 p.m. James Watt Institute, Birmingham. Paper: "Characteristics and Performance in Service of High-voltage Porcelain Insulators," by Mr. J. S. Forrest, M.A., B.Sc.

North-Western Centre.—Saturday, December 6th, 2.30 p.m. Engineers' Club, Albert Square, Manchester. Paper: "Outdoor Bushings—their Construction, Testing and Standardisation," by Mr. W. A. Cook, B.Sc.

North-Eastern Centre.—Monday, December 8th, 6.15 p.m. Neville Hall, Westgate Road, Newcastle. Subject to be notified. *Students' Section.*—Friday, December 5th, 6.30 p.m. Neville Hall. Paper: "High-voltage Phenomena," by Mr. G. H. Hickling.

North Midland Centre.—Saturday, December 13th. Leeds. Paper: "Metal Rectifiers," by Messrs. A. L. Williams, Ph.D., M.Sc., and L. E. Thompson, B.Sc.

Association of Supervising Electrical Engineers.—Saturday, December 13th, 2.30 p.m. Lighting Service Bureau, Savoy Hill, London, W.C.2. Lecture: "Economics of Installation Planning," by Mr. H. Murray Winstanley, M.I.E.E.

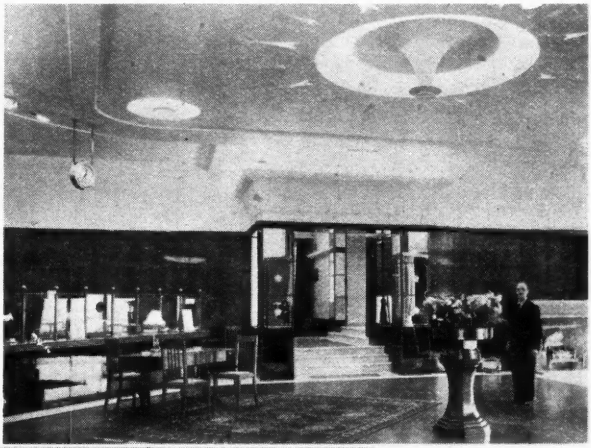
Croydon's New Showrooms

A Rare Wartime Occasion

THE opening of new electricity showrooms and offices is something of an event in these days when building is practically confined to premises directly connected with the war. Having started the construction of its new premises a few months before the war, and having placed orders for the necessary equipment, the Croydon Electricity Department has been able to proceed, at a reduced rate, with the completion of at least the major portion of the work. Though not in its full peacetime glory, the building has been sufficiently completed to serve as a pattern for other electricity undertakings to study, when once again they are permitted to embark on showroom schemes of their own.

Standing on a corner site roughly 160 ft. square in what is scheduled for development as one of the most important shopping centres of the borough, the building is arranged on three floors round a centre circular courtyard, which after the war, with an illuminated fountain in the centre and show-windows in the covered colonnade round the periphery, will be one of the most attractive features. The showroom proper extends the whole length of the ground floor on the frontage facing the main road, with "open" type windows enabling passers-by to obtain a clear view inside.

The main entrance, through unique swing doors of decorative armour plate glass, opens into a large vestibule where consumers' accounts can be paid.



The reception hall and (left) a portion of the showrooms at the Croydon Electricity Department's new premises

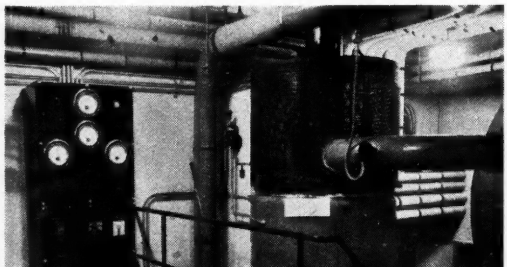
One of the principal attractions of this entrance hall is the ornamental colour-lighted ceiling fitting. Like the remainder of the lighting fittings in the building, all of which have been specially made by Troughton & Young, Ltd., it provides concealed lighting, no lamp bulb being visible anywhere throughout the premises. Another pair of armour plate glass doors leads from here into the showroom which has an inquiry counter in the centre and glass

partitioned offices for the demonstration and showroom staff along the side away from the windows. Panelling of the walls is carried out in veneered walnut with black glass dado and panelling at the bottom to provide an effective background for showing off apparatus. Every wall panel is removable in case any special demonstration scheme is desired needing special wiring, while lavish provision of plug points in both walls and floor facilitates connection. Fluorescent colour lighting of the cornices, now manually operated, will be equipped with an automatic colour changing device after the war.

Across the courtyard from the showrooms is a demonstration theatre, the completion of which will unfortunately have to wait until happier days. Enough of the building has however, been finished to see its final form. Measuring about 100 ft. long by 40 ft. wide, it is designed to serve as one large hall or three small ones, a revolving floor making it possible to use the portion at one end either with tiers of seats sloping downwards to a demonstration stage at a low level, or with a flat floor and an orchestra pit at the same level as the remainder of the hall. At the other end of the hall will be a servery for catering purposes. Not only will this hall be available for the use of the Electricity Department, but it is also likely to be much in demand for concerts and social functions of all kinds. Eventually there will be two more floors constructed above the theatre for use as offices.

A portion of the top floor of the existing new offices above the showrooms is at present utilised as a temporary demonstration theatre, but it will probably be used eventually as a staff canteen. This and rest rooms on other floors are all connected by service lifts with the basement, which will be laid out as a kitchen. The telephone exchange on this floor is arranged so that it can quickly be transferred to the basement for A.R.P. purposes if necessary, while the fire alarm system throughout the building is connected directly with the fire station.

Administrative offices, including the board room, occupy the second floor, the first floor providing accommodation for the costing and accounts departments. In the latter an interesting feature is the four individual waiting-rooms, where any queries can be investigated. All the wiring for the telephones, accounting machines, etc., is run in the floor. Communication between the various floors is by means of fully automatic lifts (Waygood-Otis) and two staircases. At the bottom of the main staircase is the Electricity Department's coat of arms in mosaic, while in a panel close by it is planned to place a portrait of Faraday.



The 750-kW electrode boiler employed for the thermal storage system

The basements are at present being used as gas-proof air-raid shelters both for the staff and the general public. In the section for the latter accommodation is available for 850 persons, who are fortunate in having for their comfort and convenience good lighting, conditioned air, hot and cold water for washing and a fully equipped canteen. Also situated in the basements are the switchroom with neat panels of flush design by G. P. Dennis, Ltd., and with M. & C. circuit-breakers; a "Keepalite" emergency lighting set; air-conditioning plant for both the shelters and the ground floor; and thermal storage plant for heating the building and providing domestic hot water. The 750-kW Sulzer Bros. electrode boiler used in the thermal storage system operates, off peak, on a 6,600-V, three-phase supply and with its 25,000-gal. storage cylinder, Bull "Supersilent" motors for the water pumps and a foolproof system of control, it is guaranteed to maintain a temperature of 60 deg. F. all over the building with an outside temperature of 30 deg. F.

The building has been designed by Mr. Robert Atkinson, architect; Kent & Sussex Contractors, Ltd., were the contractors and the electrical work was carried out by Duncan Watson (Electrical Engineers), Ltd., to the specifications and under the supervision of Mr. F. N. Rendell-Baker, chief electrical engineer and general manager of the Corporation Electricity Department, who was also responsible for the design of the special lighting fittings.

COMMERCE and INDUSTRY

Power Station Appointments.

Transfer of Electricity Supply Employees

IT has already been stated by the Electricity Commissioners that the restriction of the movement of employees of electricity supply undertakings by the Essential Work (General Provisions) Order, 1941, was not intended to debar normal promotions. They have now informed electricity supply authorities, however, that they consider that in present circumstances vacancies should wherever possible be filled from within the undertaking. Electrical engineers and managers should consequently refrain from offering a post to an employee of another undertaking without first approaching the other employer to obtain his concurrence.

In this connection the Commissioners, before advising the Ministry of Labour on any future transfer cases in which they are consulted, will desire to be furnished with the observations of the undertaking with whom the man is employed as well as those of the undertaking seeking his services, with particular reference in the latter case to the circumstances in which it is necessary to go outside the undertaking to fill the vacancy.

"Deferment" of Electricians

It has been announced by the Ministry of Labour that except for men engaged in certain specified essential occupations no further deferment of calling up for service will be granted to men who were under the age of 25 on the date on which they were required to register. Journeymen electricians are regarded as being employed in an essential occupation and consequently deferment in their case is still possible.

Training the Disabled

Electrical installation work, instrument making, electric welding and radio fault finding and testing are among the occupations for which disabled men and women will be trained under the interim scheme instituted by the Ministry of Labour and National Service. Although some degree of preference may be given to those whose disablement is due to war service or to enemy action, the scheme is intended for any man or woman who is handicapped by disablement from obtaining satisfactory employment. Allowances, meals and expenses will be provided to persons in training. Fuller particulars are given in a pamphlet PL 93/1941, obtainable from Employment Exchanges.

Registration of Building Employees

The Electricity Commissioners have informed electricity supply undertakings that the new requirement that men engaged in certain building and civil engineering labour (including the digging of cable trenches) applies to the majority of undertakings which have not secured a certificate of registration under Regulation 56AB. Such undertakings are required to render a return to the Ministry of Works and Buildings upon a form (B.C.E.4) obtainable from Employment Exchanges.

Incendiary Bomb Safeguards.

The Director of the Electrical Contractors' Association has notified his members that as they have already registered under Regulation 56AB they are not affected by the new Order. The Ministry has requested, however, that, in order to make the census as complete as possible, where members employ men wholly on maintenance work they should inform the Ministry by letter of the number of men so employed. This applies only if this information was not given at the time of registration.

Fuel Economy Campaign

Since the war started Edmundsons Electricity Corporation, Ltd., has co-operated wholeheartedly in a number of Government campaigns. Food, gardening, etc., have each in their turn featured prominently in its advertisements, which since the war put a curb on electrical development, have still further emphasised the company's aims at providing "service" of the most comprehensive nature to its consumers. Continuing this policy the company now proposes to devote a quarter of its current year's advertising programme to the Fuel Economy Campaign and space is to be taken in a hundred newspapers, representing two million copies per issue, to cover all districts served by the undertakings controlled by the company. Four different advertisements are planned. The first, on more or less orthodox lines, points out the various ways in which consumers can save electricity. In the remainder particular emphasis will be laid on "Having Breakfast in the Kitchen." The method of treatment of these three is somewhat of an innovation for the company since it deals with the subject by means of cartoons, which are considered likely to prove more effective in this particular instance than straightforward appeals. As shown in the accompanying illustration, the first of these cartoons, by Illingworth of the *Daily Mail*, depicts Adolf Hitler as a sandwich-man bearing placards attempting to discourage people from having their breakfasts in the kitchen.

One of the series of striking advertisements which Edmundsons are employing for the National Fuel Economy Campaign

Machine Tool Control

The Control of Machine Tools (No. 9) Order, 1941, made by the Minister of Supply, which became operative on November 18th, is intended

to ensure that machine tools are used to full capacity in furtherance of the war effort. The Order provides that every person in the United Kingdom who has had in his possession or control certain specified types of machine tools which have not been worked for more than 60 hours in the aggregate for any period of 60 consecutive days is required to furnish particulars of such machines to the Machine Tool Control, 35, Old Queen Street, London, S.W.1. The particulars must be furnished within seven days of the period laid down and the person having possession or control must not move a machine except under licence or a special direction given by the Minister of Supply.

The Order, which is obtainable from the Stationery Office (1d.), specifies the classes of machine tool affected and contains the form of return which is to be made.

Patents and Trade Marks

Under the Defence (Patents, Trade Marks, etc.) Regulations, 1941 (S.R. & O. No. 1780, 1941, Stationery Office, 3d.), the publication of information relating to the subject matter of applications for patents or for the registration of designs may be prohibited or restricted for defence purposes. No person may make application for a patent or the registration of a design in any foreign country, except under the authority of a written permit from or on behalf of the Comptroller. Further, a person may be required to furnish any information in his possession relating to any invention, design or process; this will not prejudice his right to obtain a patent or registration for such invention or design, or if published, will not render them invalid. The use on behalf of the Crown of any drawing, model, plan or other document may be authorised if considered expedient, notwithstanding anything to the contrary in any licence or agreement. Modifications are made in the law relating to trade marks, merchandise marks, etc., in the case of essential imports. In proceedings for infringement it will be a defence that the goods were essential imports and that the mark or get-up was, or was nearly, identical with one applied overseas to the goods. Provision is also made for the protection of trade marks, etc., of firms whose trading activities are suspended or reduced in consequence of an arrangement for the concentration of production approved by the Board of Trade. Authorisation is given for the removal of restrictions under the Merchandise Marks Act, 1926, on the importation and sale of certain goods, if it is considered expedient.

Protection against Incendiary Bombs

A pamphlet entitled "Structural Precautions Against Incendiary Bombs" has been issued by the Ministry of Home Security, in which instructions based upon experience gained during the intensive raids on this country are set out. Although the measures recommended for the protection of commercial and industrial premises are voluntary it is stated that if occupiers in built-up areas fail to take the necessary steps, Regional Commissioners may have recourse to compulsion.

Methods of covering roofs to prevent the penetration of bombs are set out. In general, the use of concrete slabs and corrugated iron is recommended; it is considered that steel netting and expanded metal of practicable dimensions give no protection. If the roof cannot be made impenetrable a "stopping layer" should be used and particulars of suitable arrangements are given. It is emphasised that roofs should always be accessible; narrow light wells and alleys at the backs of some tall buildings can be a source of damage through the spreading of fire from window across to window; that cellar flaps and similar exposed basement openings should not be overlooked; and that loading yards and packing sheds adjoining buildings should be kept clear of loose packing materials.

Particulars of the relief from taxation upon the cost of adopting protective measures are given in the pamphlet.

The Ministry has produced a large poster, "The Midnight Watch," which it is intended to issue fortnightly at first and monthly later on. The object is to convey information and instruction to fire guards and civil defence workers, to build up morale, and to foster an *esprit de corps* appropriate to a trained body of men and women such as fire guards are rapidly becoming. The first issue contains a Low cartoon, a message from Mr. Morrison, an article on Luftwaffe methods by a British airman, notes on the working of the stirrup pump, and a description of the way in which Moscow handles the fire-bomb menace with a reproduction of an instruction poster for Russian fire guards. Electricity supply undertakings and commercial and industrial concerns can obtain supplies of the wallsheet from the Ministry.

Indian Import Restrictions

The import into British India of the following items is now prohibited except under special licence or under Open General Licences Nos. I to VII (United Kingdom goods are exempt under Open General Licence No. II):—Machinery; passenger lifts and parts; electrical instruments; telegraphic and telephonic instruments; flashlights, carbons, condensers, and bell apparatus; accumulators, batteries and electro-medical apparatus; electrical control gear and transmission gear, switches, switchboards, fuses, etc., for use in circuits of less than 10 A and not exceeding 250 V; regulators for use with motors designed to consume less than 187 W; bare or insulated copper wires and cables, and rubber-insulated copper wires and cables, any one core of which, not being one specially designed as a pilot core, has a sectional area of less than 0.0125 sq. in., and wires and cables of other metals of not more than equivalent conductivity; line insulators, including also cleats, connectors, leading-in tubes and the like, of types and sizes such as are ordinarily used in connection with the transmission of power for other than industrial purposes, and the fittings thereof; bare hard-drawn electrolytic copper wires and cables and other electrical wires and cables, insulated or not, and poles, troughs, conduits and insulators designed as parts of a transmission system, and the fittings thereof; electrical earthenware and porcelain.

Australian Duty Amendments

Amendments of the Australian Customs and Excise tariffs for dry batteries and wireless valves came into effect on October 30th. The Customs duty for dry batteries and cells of less than 6 V is now 8d. per lb. (previous rate 2d.) or 25 per cent. *ad valorem* (same), whichever is the higher. British preferential tariff; 11d. (5d.) per lb. or 42½ per cent. *ad valorem* intermediate tariff; and

11½d. (5½d.) per lb. or 48¾ per cent. *ad valorem* general tariff. For each £ by which the equivalent in Australian currency of £100 sterling is less than £125 at the date of exportation there is an additional duty of 0.02d. per lb. or 5 per cent. *ad valorem* except in the case of the British preferential tariff for which the additional *ad valorem* duty is 4 per cent..

On valves for wireless telegraphy and telephony, including rectifying valves, the Customs duty is 4s. 3d. (previously 2s. 3d.) each or 20 per cent. *ad valorem* British preferential; 5s. 6d. (3d. 6d.) each or 40 per cent. *ad valorem* intermediate; and 6s. (4s.) each or 40 per cent. *ad valorem* general tariff. In this case the currency addition is 0.12d. each per £ variation. The excise duty on wireless valves is raised from 1s. 9d. to 3s. 9d. each. Hitherto dry batteries have been free of Excise duty, which is now fixed at 6d. per lb.

Wages in the Contracting Industry

Recently as a result of arbitration the war addition payable to electricians in the contracting industry was raised to 18s. 4d. per week. The Electrical Trades Union then contended that the increase should be made retrospective. This claim was resisted by the National Federated Electrical Association, which asked the National Arbitration Tribunal to make a declaration against it. The Tribunal heard the matter on November 12th and has issued an award (No. 151) the effect of which is to give the declaration for which the N.F.E.A. asked. It holds that the agreement made on October 22nd, 1940, held good until the award of August 14th last.

Scottish Electricians' Wages

As a result of discussions between representatives of the electricians in the Scottish electrical contracting industry and the E.C.A. of Scotland the country allowance for the men has been increased by 8d. a day, making the weekly total 22s. 2d. At the same time the war bonus agreement has been revised to give an increase of a farthing per hour for each three points rise in the cost of living figure up to 200 points, with a maximum of 3½d. per hour, and thereafter a rise of a farthing for each four points rise.

War Risks Insurance

The Board of Trade, with the approval of the Treasury, has decided that, in respect of the period beginning December 3rd, 1941, and ending March 2nd, 1942, the rate of premium payable under any policy of insurance issued under the Commodity Insurance Scheme shall continue to be at the rate of 7s. 6d. per cent. per month.

Export Control

The Export of Goods (Control) (No. 39) Order, dated November 11th, embodies all amendments published since the No. 19 Order and revokes that and subsequent Orders. It is obtainable from the Stationery Office (8d. net).

Electrical Engineers in the Services

The Government has requested the Committee on Skilled Men in the Services, which was set up by the Ministry of Labour and National Service under the chairmanship of Sir William Beveridge, to extend its survey from tradesmen to professional engineers, for whom there is a constant demand for responsible technical duties in the Services. The Institution of Electrical Engineers has been asked to assist by requesting members now serving in the Forces to communicate to the Secretary of the I.E.E. full details (personal, professional and service) in order to ensure that the best possible use is made of their technical qualifications and experience.

A.R.P. Conference for Engineers

With the co-operation of the Ministry of Home Security a whole-day conference on air-raid precautions relative to the engineering industry will take place in the Central Hall, Westminster, on December 9th. Senior officers of the Ministry's Research and Experiments Department will present information and outline their accumulated experience, giving opportunities for discussion. Among the papers to be read will be one by Major J. W. Martin, who will survey the gas contamination problem in the engineering industry, with special reference to electrical machinery. Admission will be restricted to corporate members of the Institutions of Civil, Electrical and Mechanical Engineers, which will issue tickets in response to written applications.

Replacement Radio Valves

It was reported at the meeting of the Council of the Wireless Retailers' Association held at Nottingham on November 12th that representations had been made to the Board of Trade to secure the release of valves, in view of the fact that many radio receivers were lying idle owing to the lack of replacement valves. The Board of Trade intimated that in the case of U14 supplies would be generally released within two months. Very little material improvement in supplies of PenA4 could be expected until the first part of 1942. It was reported that the Board of Trade had now been asked to allow the importation of American valves.

Cut in American Refrigerator Production

The United States Director of Priorities has ordered a reduction in the output of domestic mechanical refrigerators of 43.2 per cent. upon the monthly average for 1940-41 for the period August 1st to December 31st. It is anticipated that for the year ending June 30th next the output will be about 2,000,000 units (electric and gas) as compared with 3,670,000 in the preceding year. By this means it is hoped to save 175,000 tons of steel in a year as well as substantial quantities of non-ferrous metals, etc.

Fatalities

A verdict of "Accidental death" was recorded at an inquest at Bangor recently on Robert O. Williams (41), who was electrocuted in a substation. The deputy coroner, Mr. S. Jones, said that there was considerable evidence of events leading up to the accident, but silence on the essential point. He was satisfied that Williams, who had been engaged on work in the substation, received no order to go to the cubicle where he met his death. The safety lever on a panel on the outside of the cubicle had been removed by someone, possibly because it was thought the cubicle was not in use. Had it been put back the accident would not have happened. There was a series of minor incidents which caused the transformer to be "live." He was not at all satisfied with regard to the removal of an earthing wire from the transformer and the substitution of

a thin wire which did not serve the purpose by someone who had not come forward, but he did not say that these incidents were done deliberately.

An inquest was held at Chislehurst recently on Mrs. Elizabeth Yeatman (61), who was found dead in her bath, an electric bowl fire with a defective flex being on the bathroom floor. Medical evidence showed that there were burns on her right hand, and it was suggested that she had either clasped the fire bowl or the defective flex. Mr. O. Penfold, district mains engineer, West Kent Electric Co., said he found that 3½ in. of the connecting twin lighting flex was defective. A verdict of "Accidental death" was returned.

Wages in the Cable-making Industry

The Joint Industrial Council for the Electrical Cable Making Industry announces that the cost-of-living figure on November 1st (100 per cent. above the 1914 level) will not involve any alteration in wages on the third pay-day in December.

Import Duty Exemptions

Several classes of electrical equipment are added to the list of goods exempt from the general *ad valorem* import duty by the Import Duties (Exemptions) (No. 4) Order, 1941 (Stationery Office, 2d.). They include insulated wires and cables; telegraph and telephone apparatus; wireless apparatus of all kinds; rectifiers "similar to wireless valves"; accumulators; carbon electrodes (other than primary battery carbons and arc lamp carbons); furnaces; searchlights; ammeters not already included in the Exemptions Schedule; and parts of arc lamp carbons.

For the period from November 19th to December 31st the following goods are exempted from the Safeguarding of Industries duty: Wireless valves and similar rectifiers and parts; ignition magnetos and permanent magnets; parts of arc lamp carbons; and amorphous carbon electrodes (not including primary battery carbons or arc-lamp carbons). These additions are made by the Safeguarding of Industries (Exemption) No. 5 Order, 1941 (Stationery Office, 1d.).

New Catalogues and Lists

T.M.C.-Harwell (Sales), Ltd., Britannia House, 233, Shaftesbury Avenue, London, W.C.2.—Illustrated catalogues Nos. 740 and 4007 dealing with "Temco" switches, switch plugs, connectors, adaptors and other lighting accessories; and with "Agro" lampholders, ceiling roses, bells with transformers and indicators.

Wardle Engineering Co., Ltd., Elsinore Road, Old Trafford, Manchester, 16.—Leaflet notifying wartime price advances.

INFORMATION DEPARTMENT

GENERAL inquiries from readers relating to sources of electrical goods, makers' addresses, etc., are replied to by our Information Department through the post. Inquiries should be accompanied by a stamped addressed envelope.

Our extensive records enable us to reply to most queries, but occasionally we ask for our readers' assistance in tracing names and addresses not known to us. We should be glad to have such information regarding the following :—

BEEMAC handlamps.

CONNAUGHT electric fire.

MISER handlamps and floor standards.

D.I.E.E. Area Organisation

THE Director of Industrial Electrical Equipment has set up an Area Organisation to give advice and assistance to war factories in matters arising out of damage by enemy action to industrial electrical equipment. An Electrical Adviser has been appointed in each of the Defence Areas, and a number of electrical engineers in the area are available as his assistants in case of need. All these gentlemen serve in an honorary capacity. This Area Organisation has undertaken, on behalf of D.I.E.E., a survey of the electrical repair capacity and the stocks of electrical equipment which could be called upon in an emergency. Close collaboration is maintained with the Machine Tool Control area and repair organisation, the Ministry of Aircraft Production emergency services organisation and the Ministry of Works and Buildings emergency works department. The services of the Electrical Advisers and their assistants are available through these organisations. The Advisers are as follows:—

Area 1 (Northern): Mr. J. Clement, British Thomson-Houston Co., Ltd., Ellison Place, Newcastle, 1 (tel.: Newcastle 25040).

Area 2 (East and West Ridings): Mr. L. G. Bryden, Crompton Parkinson, Ltd., 4/6, New York Road, Leeds (tel.: Leeds 30511).

Area 3 (North Midlands): Mr. B. Gill, Midland Dynamo Co., Ltd., 64, Belgrave Gate, Leicester (tel.: Leicester 20172).

Area 4 (Eastern): Mr. J. H. Enion, Igranic Electric Co., Bedford (tel.: Bedford 2233).

Area 5 (London and South Eastern): Mr. A. W. Berry, Crompton Parkinson, Ltd., Electra House, Victoria Embankment, London, W.C.2. (tel.: Temple Bar 5911).

Area 6 (Southern): Mr. M. G. R. Elliott, Lancashire Dynamo & Crypto, Ltd., 94, Petty France, London, S.W.1. (tel.: Whitehall 7211).

Area 7 (South Western): Mr. A. H. Topham, Mawdsley's, Ltd., Dursley, Glos. (tel.: Dursley 186).

Area 8 (Wales): Mr. H. Coope, Metropolitan-Vickers Electrical Co., Ltd., Merwyn House, Frederick Street, Cardiff (tel.: Cardiff 4712).

Area 9 (Midland): Mr. T. G. Travis, General Electric Co., Ltd., Witton, Birmingham, 6 (tel.: Birmingham East 1941).

Area 10 (North Western): Mr. J. I. Law-Brooks, Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester (tel.: Trafford Park 2431).

Area 11 (Scotland): Mr. G. S. Helme: Lancashire Dynamo & Crypto Ltd., 80, Blythswood Street, Glasgow (tel.: Central 3983).

Area 12 (Electrical Adviser to N. Ireland Ministry of Commerce): Mr. H. W. Richardson, District Admiralty Electrical Engineer, Harland & Wolff, Ltd., Queen's Island, Belfast (tel.: Belfast 57223).

ELECTRICITY SUPPLY

Further Belfast Discussions. American Plant Speed-up.

Colchester.—TRANSPORT COSTS.—The borough electrical engineer (Mr. G. P. Dixon) has prepared an analysis of the transport costs of the Electricity Department which indicates that these costs have been reduced from 4s. per annum per consumer in 1933 to 2s. 9d. in the past year, and that the cost of transport per kWh sold has been more than halved during that period.

Croydon.—NEW SHOWROOMS.—Explaining the urgent need for the new electricity showrooms described on page 607, at an official inspection last Saturday, Councillor A. Lester Boddington, chairman of the Corporation Electricity Committee, stated that when the Electricity Department opened the premises in High Street in 1926 it had 17,590 consumers, but at March 31st, 1939, the number had grown to 59,071. In the year ended March 31st, 1926, 22 million kWh of electrical energy was sold, whereas in the year ended March 31st, 1939, sales had reached 111 million kWh. The building and its equipment had not cost the ratepayers one farthing. It had been financed entirely out of the earnings of the Department, mainly out of the reserve fund.

At the conclusion of Councillor Boddington's remarks Councillor Aston, chairman of the Showrooms Sub-Committee, drew attention to a few of the special features of the building.

Essex.—AIR-RAID SIREN HEATERS.—The County Emergency Committee is to provide heaters for 54 air-raid sirens at a cost of £1,203.

Horsham.—ELECTRICITY ACCOUNTS.—We have received, somewhat belatedly, a copy of the Council's abstract of accounts for the year ended March 31st, 1940, containing the accounts of the Electricity Department, together with the report of the electrical engineer (Mr. F. Ffrench). These show a small profit on the year's working (£484), and satisfactory progress was made. The total cost per kWh sold decreased from 1.91d. to 1.90d.

London.—ST. MARYLEBONE.—The Emergency Committee is to install electric heating in additional shelters.

Northern Ireland.—LONDONDERRY AND THE MERGER.—At a recent meeting of the Londonderry Electric Light Committee the Mayor (Senator F. J. Simmons), the chairman of the Committee (Councillor J. H. Welch) and Sir James Wilton were appointed to look after the town's interests in connection with the Government's proposal to set up a new authority to control the electricity undertakings of Belfast, Londonderry and Larne. The electrical engineer (Mr. R. V. Macrory) stated that he would raise the matter at a meeting of the Belfast Centre of the Institution of Electrical Engineers.

BELFAST OPPOSITION.—When the Belfast Electricity Committee met again last week it unanimously rejected the proposal on the grounds that war needs could be properly met without absorption of the undertaking, and the Minister of Commerce was invited to meet the Committee once more in order that any misunderstandings might be removed if possible. The Committee has put forward a counter-proposal.

FARMERS' ATTITUDE.—Referring to the proposal, a joint meeting of the Executive and War Committees of the Ulster Farmers' Union recently passed a resolution recalling that for many years the Union had expressed a desire to see a wide and enterprising scheme introduced which would provide for the extension of electrical facilities throughout the whole of the Province in such a way as would make it available to the rural population. The general scheme envisaged by the Union would require to make provision for the supply of electricity at a fair and moderate rate without the present most hampering restrictions whereby users were required to meet the cost of transformers, etc., and to give guarantees of heavy consumption. This, in the considered opinion of the Union, could only be achieved by unifying the generation and distribution of electricity in Northern Ireland under the control of the National Electricity Board. The Executive of the Union recommended a bold, courageous and enterprising scheme of the kind which would be a forward step with far reaching possibilities which would tend to greater agricultural development and would increase considerably the attractions of country life.

Nottingham.—ELECTRICITY CHARGES.—It is reported that a sub-committee of the Electricity Committee has recommended a reversion to the scale of charges which was in operation before the increase made a year ago. If this is adopted the ordinary flat rate for lighting will be reduced from 4½d. to 4d. per kWh, and the domestic tariff standing charge from 16⅔ per cent. on assessment to 15 per cent. No increase was made for power.

West Bromwich.—LOWER CHARGES.—In detailing the reductions in the tariff of charges of the electricity undertaking (of which Mr. F. Jasper Cole is engineer and manager) in our issue of November 14th, the new lighting flat-rate for shops and business premises was given incorrectly. The charge has, in fact, been reduced from 6d. to 4d. per kWh, not from 6d. to 5d. as stated.

Overseas

Canada.—PLANT COMMISSIONED.—The first of two units in the new Big Eddy generating station on the Musquash River was started up during October, providing an additional 4,950 HP for the Georgian Bay power pool. The second unit was due to come into commission at the end of the month. The plant operates under a head of 36 ft., the headwater approximating to the tailwater level at Ragged Rapids. The turbines are of the propeller type. Two other developments are under construction. At Barrett Chute, on the Madawaska River, a 54,000-HP plant costing about $4,000,000 is being rapidly completed for the Eastern Ontario pool. It is scheduled to be ready by July next. The Decew Falls plant in the Niagara district will cost about $5,000,000 and will develop 65,000 HP, but is not expected to be ready until December, 1942.

INCREASED ONTARIO LOAD.—The Hydro-Electric Power Commission of Ontario reports that primary load for all systems in September last was 1,983,729 HP against 1,732,799 HP in September, 1940, an increase of 14½ per cent. Primary and secondary loads for all systems totalled 2,149,138 HP (against 1,928,161 HP).

Japan.—REORGANISATION DELAYED.—There are indications that the projected reorganisation of power transmission enterprises, scheduled to be completed by March next year, may not be realised as planned since the Ministries concerned (Communications, Finance and Home Office) have still to come to an agreement. The Ministry of Communications' efforts to enforce the amalgamation of the leading power transmission companies into a number of national concerns is meeting with many difficulties, with the result that it is feared that the inability of Government Departments to agree and the consequent delay in the issuing of the decree may eventually lead to the defeat of the Ministry's plan. Such a development would necessitate a completely new approach to the problem of controlling the nation's electric power industry.

North China.—POWER PLANS.—In addition to the extension of the thermal generating facilities, the authorities of North China have been planning to develop the power resources of the Lwan, Yungting and Yellow Rivers. It was made known some time ago that construction work would start shortly on hydro-electric plants along the Lwan River. For the development of water-power resources and uniform control of transmission two companies were organised, the Mengkiang Electric Co. and the North China Electric Power Co. Both are under Sino-Japanese control.

Sweden.—NEW POWER STATION.—The building of a large new power station in the province of Västerbotten in north Sweden has been decided on by the authorities of the town of Skellefteå, states the official German news agency. The station will be built on the Skel waterfalls of the Skellefte River at a cost of Kr. 10,500,000.—*Reuter's Trade Service.*

United States.—T.V.A. SPEEDS UP PLANT CONSTRUCTION.—Completion of Kentucky Dam, the Tennessee Valley Authority's largest project, has been advanced by a full year to January, 1944, and the first generating unit is scheduled to be ready by February, 1944, fifteen months ahead of schedule, reports the *Electrical World*. Cherokee Dam, authorised in July last year, is nearly finished and the first of three 30,000-kW generating units is to be ready by April next. This compares with the three years taken to build the Norris Dam. Construction of the Watts Bar Dam steam and hydro plant has reached an advanced stage; the initial installed generating capacity at the Dam will be 90,000 kW, and four 60,000-kW units are planned for the steam plant. Projects in hand will nearly double the Authority's present installed capacity of 1,050,000 kW.

The House of Representatives has approved a deficiency appropriation of $6,000,000 to speed up the schedule for installing generators at Grand Coulee Dam. The money will enable the Bureau of Reclamation to order units Nos. 7, 8 and 9 (of 108,000 kW capacity each) for the first power-house and to start construction of the second building. In the same measure the House has included $1,750,000 for an additional 80,000-kW unit for Boulder Dam. Under the Federal Power Commission's programme three units were to be installed at Grand Coulee by the winter of 1942-43 and one more in each of the years 1943, 1944 and 1945. As it is, one unit is already on the line, Nos. 2 and 3 will be in operation before the spring and altogether six units are scheduled by 1943 or earlier.

TRANSPORT

Italy.—BRENNER-CALABRIA RAILWAY ELECTRIFIED.—A *Reuter* message from Rome reports that the railway line between Calabria, the southernmost province of Italy, and the Brenner Pass, in the north, has now been completely electrified. The final section between Bologna and Trento, was put into service on November 16th.

Straits Settlements.—IMPROVEMENTS IN COLLECTOR EQUIPMENT.—In his report for 1940 Mr. T. Rogers, M.I.E.E., A.M.I.Mech.E., municipal transport manager of George Town, Penang, states that in regard to the trams and trolley-buses, early in the year a change-over was made from trolley wheels to shoes with carbon inserts, and these were a big improvement. Noise was much reduced and wear was less. A considerable amount of work was done in fitting the overhead negative with section insulators and changing the control boxes for double switching. Arrangements were also made for special testing of all overhead lines each night.

RADIO & TELEPONHY

Great Britain.—MAINS RADIO.—The December issue of the *Wireless World* contains an article on "Broadcasting over the Mains," by Capt. P. P. Eckersley, M.I.E.E. (formerly chief engineer of the B.B.C.) in which the technical details of the scheme are explained.

Spain.—NEW TRANSMITTER.—A powerful new Government radio station has been inaugurated at Cape Mayor, on the Santander coast. It will be used principally for communication with shipping.—*Reuter.*

A Gas Engineer's Candour

IN a leaderette in this issue we refer to statements by Mr. L. P. Ingram, quoted in the *Gas Times*. They occurred in a paper presented to the Midland Association of Gas Engineers and Managers and read as follows :—

Having admitted electricity as an essential service in the modern home, what adequate reply have we to our competitors' two part tariffs, with a commodity charge of ½d. per unit or less?

(1) Price—nothing in it. Some of the diehards will say that there is no electricity sold for domestic purposes at ½d. per unit and that part of the standing charge should be allocated to each unit consumed. May I suggest that this ostrichlike pose will merely result in their tail feathers getting scorched. The standing charge is paid for lighting, wireless and vacuum, and all additional consumption is at commodity charge rates only.

(2) Speed—only a selling point. Is the minute saved in boiling a kettle of vital importance?

(3) Ease of control—the electric "regulo" is almost, if not quite, here.

(4) Reliability—largely wishful thinking on our part.

(5) Cleanliness—gas is out of the picture.

(6) Healthy ventilation—why not a separately controlled electric fan, available as and when required, with the added advantage of air conditioning?

(7) Instantaneous water heating—in wholesale housing reconstruction there are very great possibilities for electric "off peak" storage water heating, thereby attacking one of our last strongholds—the gasholder.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Conversion of Utilities' Stocks.—In the House of Commons last week the Chancellor of the Exchequer said that, after consulting the Capital Issues Committee, he was satisfied that it would be in the national interest to permit public utility undertakings to convert issues bearing interest at over 4 per cent. to lower rates, on terms and rates to be agreed upon in each case, provided that they were in accordance with the terms of the prospectus under which the issues were originally made. He proposed, in the first instance, to deal with those cases in which Treasury consent in principle had already been given. He could not see his way at present to lift the ban on other optional conversions.

It is assumed by the Stock Exchange that this means that conversion will be permitted where an optional redemption date has been reached in the case of any public utility undertaking's securities bearing interest at more than 4 per cent. There are not many of these in the electricity supply and traction field. An outstanding case is the 5 per cent. consolidated debenture stock of the North-Eastern Electric Supply Co., Ltd., which was redeemable after July 1st this year. The Newcastle & District Electric Lighting Co., Ltd., can redeem its 4½ per cent. first mortgage debenture stock at any time at six months' notice. The 5 per cent. redeemable debenture stock of the Yorkshire Electric Power Co. has been repayable since May last at 102; and the 5½ per cent. debenture stock of the Electric Finance & Securities Co., Ltd., became redeemable at any time after last year.

Another stock which falls due for optional repayment next year is the 4½ per cent. Trade Facilities Act stock of the London Passenger Transport Board.

Crabtree Electrical Industries, Ltd., reports that the accounts for the year ended July 31st of its operating subsidiary, J. A. Crabtree & Co. show a trading profit, with other receipts, after deducting all expenses, of £173,026, as compared with £174,715 in the preceding year. Income tax requires £85,904 and after allowing for depreciation, writing off the year's expenditure on plant, patents, A.R.P., etc., and providing for war damage contributions, there remains a surplus of £72,792 (against £84,355) which with £56,948 brought in enables the company to increase its reserves by £5,000 to £180,000, pay tax-free dividends of £65,000 to Crabtree Electrical Industries and to carry forward £59,740.

The revenue of Crabtree Electrical Industries for the year ended October 31st amounted to £65,003 in tax-free dividends and bank interest, which with £19,665 brought in after charging all expenses and fees, leaves a net balance of £83,337. As already announced, the final ordinary dividend is 5 per cent., with a cash bonus of 7½ per cent., again making 17½ per cent. less tax, for the year. The balance carried forward is £19,618.

Joseph Lucas, Ltd., report that the net profit, after providing for taxation, war damage insurance, insurance and contingencies, amounted to £284,703 for the year ended August 7th, £12,614 less than for the preceding year. After providing for ordinary dividends £147,045 (£171,552), preference dividends £7,444 (£8,482), contribution to reserve £100,000 (same) and employees' fund £15,000 (same), £81,200 (£65,986) is carried forward.

The Associated Equipment Co., Ltd., is again paying a final ordinary dividend of 5 per cent., tax free, maintaining the distribution for the year at 7½ per cent. net. The dividend is equal to (approximately) 15 per cent. for the year, subject to tax at 10s. The net profit for the year to September 30th was £132,500 (against £196,500).

The Tata Hydro-Electric Power Supply Co., Ltd., reports a net profit for the year to June 30th after tax of Rs.26,52,405, as compared with Rs.29,72,950 in the previous year. The final ordinary dividend is Rs.4.8.0 per Rs.100 share, tax free (same) and the balance carried forward is Rs.2,46,252 (against Rs.2,56,618 brought in).

The Tata Power Co., Ltd., reports a net profit, after tax, for the year ended June 30th of Rs.31,70,124 as compared with Rs.38,51,064 for 1939-40. The final ordinary dividend is 4½ per cent. (against 4 per cent.), making 7 per cent. for the year (against 6½ per cent.), tax free, and Rs.1,85,159 is carried forward (against Rs.5,42,788 brought in).

The Andhra Valley Power Supply Co., Ltd., reports a net profit for the year to June 30th of Rs.18,42,409 as compared with Rs.22,38,125, plus Rs.56,215 income tax recovered during the year from preference dividends. A final dividend is paid on the old ordinary of Rs.45 per share, maintaining the distribution at Rs.75 for the year, and Rs.3,58,344 is carried forward (against Rs.3,75,191 brought in).

Burco, Ltd., earned a profit of £22,017 for the year ended September 30th last, against £12,800 in 1939-40, after providing £34,099 (against £11,216) for taxation. The final dividend of 15 per cent. makes 27½ per cent. for the year, as compared with 12½ per cent. £15,819 is carried forward against £15,761.

New Companies

Handy Battery Co., Ltd.—Private company. Registered November 7th. Capital, £500. Objects: To carry on the business of manufacturers of and dealers in electric batteries, accumulators, etc. Subscribers: G. Berger, 9, Myrdle Court, E.1, and four others. M. Wecksler is the first director. Registered office: 67, Bethune Road, N.16.

Chalfont Engineers, Ltd.—Private company. Registered October 30th. Capital, £1,500. Objects: To carry on the business of manufacturing, motor and electrical engineers, electricians, manufacturers of electric and other signs, etc. The first directors are O. B. Davis (permanent), F. E. Dell and S. Lubliner. Solicitor: W. C. Crocker, 42, Gracechurch Street, E.C.3.

Novalux, Ltd.—Private company. Registered November 10th. Capital, £1,000. Objects: To

carry on the business of manufacturers of and dealers in paraffin, oil, petrol, gas, electric and other lamps, stoves, heating and cooking appliances, gas and electric lighting fittings, lampshades, etc. Permanent directors: W. J. Gee, 40, Huron Road, S.W.17; Grace Pollard and M. Sigel, both of 120, Goldhurst Terrace, N.W.6. Registered office: 376, Strand, W.C.

St. Helens Radio Store, Ltd.—Private company. Registered November 12th. Capital, £300. Objects: To acquire the business of electrical and radio engineer carried on by R. O. Waterman at 30, Church Street, St. Helens, Lancs, as the St. Helens Radio Store. The directors are: R. O. Waterman (permanent) and Mrs. May Waterman, both of 49, Rathbone Road, Wavertree, Liverpool, 15. Registered office: 30, Church Street, St. Helens.

Companies' Returns

Statements of Capital

County of London Electric Supply Co., Ltd.—Capital, £16,500,000 in £3,381,925 6 per cent. cumulative preference stock, £3,000,000 4 per cent. cumulative preference stock, £7,082,109 ordinary stock, and 118,075 6 per cent. cumulative preference, 1,750,000 preference and 1,167,891 ordinary shares of £1 each. Return dated April 1st (filed August 18th). £3,381,925 6 per cent. preference, £3,000,000 4 per cent. preference and £7,082,109 ordinary stock taken up. £10,754,441 paid. £2,709,593 considered as paid. Mortgages and charges: £8,500,000.

Marconi's Wireless Telegraph Co., Ltd.—Capital, £4,000,000 in 3,250,038 ordinary shares of 10s. each, 499,935 ordinary shares of £1 each, 3,250,092 ordinary shares of 10s., and 250,000 7 per cent. cumulative participating preference shares of £1 each. Return dated July 11th. 3,250,038 ordinary shares of 10s., 395,114 ordinary shares of £1 and 250,000 preference shares taken up. £1,797,484 10s. paid. £472,648 10s. considered as paid. Mortgages and charges: Nil.

Cable and Wireless (Holding), Ltd.—Capital, £47,000,000 in £16,766,591 5½ per cent. cumulative preference stock, 233,409 preference shares of £1, £6,883,103 ordinary stock, and 23,116,897 ordinary shares of £1 each. All stock taken up. Return dated July 14th. £23,649,694 considered as paid. Mortgages and charges: Nil.

Electric Development & Securities Trust, Ltd.—Capital, £1,000,000 in £1 shares. Return dated August 20th. All shares taken up. £576,890 10s. paid (£1 on 264,401, 15s. on 149,986 shares and £2 on 100,000 shares). £523,109 10s. considered as paid (£1 on 485,613 shares and 5s. on 149,986 shares). Mortgages and charges: Nil.

Shoreham and District Electric Lighting and Power Co., Ltd.—Capital, £200,000 in 200,000 ordinary shares of £1 each. Return dated August 4th. 140,000 shares taken up. £133,500 paid. £6,500 considered as paid. Mortgages and charges: Nil.

Reduction of Capital

Weston Electrical Instrument Co., Ltd.—In the Chancery Division recently Mr. Justice Simonds heard a petition by this company for the consent of the Court to a reduction of its capital. Mr. Devine, appearing for Mr. Gordon Brown, for the company, said the petition asked the Court to sanction a reduction of its capital by the return of capital in excess of the wants of the company. The present capital was £40,000 in £1 shares, of which 30,000 had been issued and were fully paid up. It was proposed to effect a reduction by returning to the shareholders 19s. 11d. a share, which would amount to £29,875. The company had ample assets to effect this reduction. The business of the company was to deal in electrical appliances, machinery and hardware. The penny shares would then be consolidated into £1 shares and the capital increased to the original amount. His Lordship sanctioned the reduction.

Mortgages and Charges

Electrical Screw, Ltd.—Satisfaction in full on June 9th, 1941, of debenture dated August 20th, 1939, and registered August 30th, 1939. Notice filed November 8th, 1941. (According to the register of mortgages the debenture registered August 30th, 1939, originally secured £5,000.)

Lionel Robinson & Co., Ltd.—Satisfaction in full on October 31st, 1941, of mortgage dated April 13th, 1937, and registered April 20th, 1937. (According to the register of mortgages the mortgage registered April 20th, 1937, originally secured £500.)

Merthyr Electric Traction and Lighting Co., Ltd.—Satisfaction in full on September 15th, 1941, of trust deed dated October 23rd, 1901, securing £30,000 debenture stock, and acknowledgment of indebtedness dated February 16th, 1905, in respect of £20,000 further debenture stock, and registered November 1st, 1905, and February 21st, 1905, respectively.

British Radio Corporation, Ltd.—Satisfaction in full on October 31st, 1941, of first mortgage debentures authorised March 27th, 1933, and registered April 1st, 1933, securing £5,000. (£1,795 debentures only were issued, the remaining £3,205 having been cancelled.)

Receiver Released

G. Lawrence & Co., Ltd.—J. W. Lodge, of Lloyds Bank Chambers, Truro, ceased to act as receiver on October 12th, 1941.

Liquidations

Marelli & Co., Ltd.—Winding up voluntarily. Liquidator, Mr. T. A. Ryder, 4-6 Throgmorton Avenue, London, E.C.2.

Warner's Radio & Electric, Ltd.—Meetings January 2nd at 185–188, High Holborn, London, W.C.1, to receive an account of the winding-up by the liquidators.

Bankruptcies

I. F. Berners and **C. J. Berners**, trading as Major Manufacturing Co., battery manufacturers, late of 98, Great Tower Street, E.C.4.—A sitting of the London Bankruptcy Court was held on November 20th before Mr. Registrar Parton for the public examination of these debtors, whose accounts showed liabilities of £1,700 against assets valued at £2,473. They do not admit insolvency, and stated that their present position was due to the failure of a creditor to carry through a contract in connection with batteries. They began the business in February, 1940. On two occasions their premises were destroyed by enemy action. The examination of both debtors was concluded.

STOCKS AND SHARES

TUESDAY EVENING.

THE outstanding feature of the Stock Exchange markets is the demand for shares in commercial and industrial companies. Other markets have somewhat suffered from the switching-over of public interest from gilt-edged securities, Home Railway stocks and foreigners, into industrial channels. There would appear to be substantial amounts of money available for employment in ordinary and preference shares, and when the query is raised as to where all the money can be coming from, few can supply anything like a satisfactory answer. The starting of a military offensive in the Western Desert did much to cheer Stock Exchange markets, and prices in most departments remain steady with an impressive upward tendency in the commercial and industrial lists.

Price Fluctuations

The strength of the Home Railway market is shown by improvements in the 5 per cent. preferred and the 5 per cent. preference stocks of the Southern Railway. Both are two points to the good at 63½ and 104½ respectively. London Passenger Transport issues are unchanged. Central Electricity Board stocks continue in request, and the 3¼ per cent. of 1974/94, at 96½, is 10s. higher.

In the foreign group, Mexican Electric Light 5 per cent. first mortgage bonds are 10 points up at 75, satisfaction being general at the agreement which has been reached between the United States and Mexico on vexed questions which have been outstanding for years past. Brazilian Tractions hold their improvement at 12½. Of the electricity shares, Jerusalem Electric at 18s. 9d. gained 1/16, on the Libyan news. Calcutta Electric and Cawnpore Electric are both a shade harder.

Equipment and Manufacturing

The various dividends recently announced are mostly as good as anyone had expected. It is being recognised that the effect of E.P.T. can now be fairly well measured. Many of the reports now appearing reflect the full burden of the tax as it relates to a full twelvemonths' working. Callender's at 73s. 9d. and British Insulated at 90s. have gone back a trifle. On the other hand, General Electrics tread hard upon the heels of £4 per share. Arons strengthened to 22s. 6d. Birmingham support for Walsall Conduits led to the price improving to 32s. 6d. Lancashire Dynamo are also better at 63s. 9d., and Westinghouse Brake are up a florin at 49s. 6d. Crabtree Electrical are unchanged at 28s. 3d. The report shows that the results for the past year were very nearly the same as those of the previous twelve months, although taxation is £13,500 higher. Strand Electric 5s. shares remain at 3s. 6d. The dividend of 4 per cent. is twice that of last year, and, on this basis, the return comes to £5 14s. 4d. per cent. "Emi" shares at 15s., British Aluminium at 44s. 6d. and Hall Telephones at 15s. 7½d. have gains to their credit. London Associated Electric at 19s. 6d. and Associated Equipment at 52s. 9d. are amongst those which have improved. The last-named company has again made up its dividend for the year to 7½ per cent. net.

Electrical Switchgear

Electrical Switchgear & Associated Manufacturers again pay a 10 per cent. dividend on the 10s. ordinary shares, the price of which is still supposed to be about 20s. "Supposed to be" is the correct way of describing the market in the shares, of which there is practically none. Some years ago, the British Oxygen Co. took over the Electrical Switchgear & Associated Manufacturers, absorbing nearly all the shares, the result being that, although the price is quoted at 20s. middle, it is very difficult to deal.

Cable Stocks

A rise of three points in Cable and Wireless ordinary stock to 71, shows that the recent attention drawn to the opportunity which the price presented for appreciation, when it stood at 65, has not been ignored. The preference remains at 105, and reference to the yield column in our tables will show that there is now less than 10s. per cent. difference between the return on the two stocks. Marconi Marines have risen to 28s. 9d.; Canadian Marconi at 6s. are 9d. higher. A further improvement in Oriental Telephones has raised the price to 77s. 6d. Globe Telegraph ordinary and preference are unchanged. Atlas Electric Trust holds its rise at 4s.; last week's shareholders' meeting produced some very plain speaking in connection with the duties of directors and, also, the freedom of the Press.

Lower Interest Rates

The Chancellor of the Exchequer announced last week in the House of Commons that the Treasury had decided to lift the ban previously imposed upon the right of public utility companies to convert issues, bearing interest at over 4 per cent., to lower rates, provided that the conversions were in accordance with the terms of the original prospectus. The restriction was imposed soon after the outbreak of war, in order to leave the field clear for Government borrowing. Since then various borrowers have been allowed to replace highly interest bearing stocks with others that carry a lower rate; in such cases, of course, as those where the companies have the power to do so.

The decision will affect several of the well-known electricity supply companies with stocks that bear interest at a higher rate than

(*Concluded on page* 619)

ELECTRICAL INVESTMENTS

Prices, Dividends and Yields

Company	Dividend 1939–40	Dividend 1940–41	Middle Price Nov. 26	Rise or Fall	Yield p.c. £ s. d.
Home Electricity Companies					
Bournemouth and Poole	15	12½	52/6	..	4 15 5
British Power and Light	7	6	26/–	..	4 12 4
City of London	7½	7	25/9	..	5 8 9
Clyde Valley	8	8	37/6	..	4 5 4
County of London	10½	8	35/–	..	4 11 5
Edmundson's:					
7% Pref.	7	7	32/6	..	4 6 2
Ord.	6	6	27/6	..	4 7 3
Elec. Dis. Yorkshire	9	9	42/–	+9d.	4 5 9
Elec. Fin. and Securities	12½	12½	43/9	..	5 14 2
Elec. Supply Corporation	11½	10	43/9	..	4 11 4
Isle of Thanet	2	Nil	9/–	..	—
Lancs Light and Power	7½	7½	33,9	..	4 9 0
Llanelly Elec.	5½	5½	21/6	..	5 2 4
Lond. Assoc. Electric	5½	4½	19/6	+9d.	4 12 4
London Electric	7	7	24/6	..	5 14 3
London Power Deb. Red.	5	5	104	..	4 16 2
Metropolitan	10	8	36/3	..	4 8 5
Midland Counties	8	8	37/6	..	4 5 4
Mid. Elec. Power	9	9	38/9	..	4 13 0
Newcastle Elec.	7	7	27/6	..	5 1 10
North Eastern Elec.:					
Ordinary	7	7	29/6	..	4 15 0
7% Pref.	7	7	32/6	..	4 6 2
Northampton	10	10	44/6	..	4 10 0
Notting Hill 6% Pref. (£10)	6	6	8½	..	—
Northmet Power:					
Ordinary	10	7	35/–	..	4 0 0
6% Pref.	6	6	29/6	..	4 1 4
Richmond Elec.	6	6	22/6	..	5 6 8
Scottish Power	8	8	38/3	..	4 3 4
Southern Areas	5	5	18/3	..	5 9 7
South London	7	7	23/6	..	5 19 2
West Devon	5	5	21/3	..	4 14 1
West Glos.	4½	4½	19/6	..	4 12 4
Yorkshire Elec.	8	8	32/6	..	4 1 0
Overseas Electricity Companies					
Atlas Elec.	Nil	Nil	4/–	..	—
Calcutta Elec.	8*	7*	37/6	+6d.	—
Cawnpore Elec.	10	10	28/9xd	+3d.	6 19 0
East African Power	7	7	27/–	..	5 3 8
Jerusalem Elec.	7	5	18/9	+1/16	5 6 8
Kalgoorlie (10/–)	7½	7½	13/–	..	5 15 5
Madras Elec.	6*	4*	22/6xd	..	3 11 1
Montreal Power	1½	1½	25½	..	5 13 2
Palestine Elec. "A"	Nil	Nil	17/6	..	—
Perak Hydro-elec.	2½	6	18/9	..	6 8 0
Shawinigan Power	83cts.	90cts.	15½	..	—
Tokyo Elec. 6%	6	6	30½	..	19 13 6
Victoria Falls Power	15	15	80/–	..	3 15 0
Whitehall Inv. Pref.	7½	7½	15/–	..	10 0 0

Company	Dividend 1939–40	Dividend 1940–41	Middle Price Nov. 26	Rise or Fall	Yield p.c. £ s. d.
Public Boards					
Central Electricity:					
1950–70	5	5	110	..	4 11 1
1955–75	5	5	114	..	4 7 9
1951–73	4½	4½	107	..	4 4 1
1963–93	3½	3½	101	..	3 9 4
1974–94	3½	3½	96½	+½	3 7 4
London Elec. Trans. Ltd.	2½	2½	96½	..	2 11 10
London & Home Counties 1955–75	4½	4½	109	+1	4 2 7
Lond. Pass. Trans.:					
A	4½	4½	117½	..	3 16 8
B	5	5	116½	..	4 5 10
C	1½	3	41	..	7 6 4
West Midlands J.E.A. 1948–68	5	5	108½	..	4 12 0
Telegraph and Telephone					
Anglo-Am. Tel.:					
Pref.	6	6	106½	..	5 12 9
Def.	1½	1½	24½	..	6 2 5
Anglo-Portuguese	8	8	15/-xd	+3d.	10 13 4
Cable & Wireless:					
5½% Pref.	5½	5½	105	..	5 4 10
Ord.	4	4	71	+3	5 12 8
Canadian Marconi $1	Nil	4cts.	6/–	+9d.	3 0 0
Globe Tel. & Tel.:					
Ord.	8½*	8½*	30/–	..	—
Pref.	6	6	28/9	..	4 3 6
Great Northern Tel.:					
(£10)	20	20	14½	..	—
Inter. Tel. & Tel.	Nil	Nil	3	..	—
Marconi-Marine	7½	7½	28/9	+1/16	5 4 4
Oriental Tel. Ord.	11½*	16	77/6	+1/16	4 2 6
Telephone Props.	6	6	11/3	..	10 13 4
Tele. Rentals (5/–)	10	10	8/9	..	5 14 3
Traction and Transport					
Anglo. Arg. Trams:					
First Pref. (£5)	Nil	Nil	2/6	..	—
4% Inc.	Nil	Nil	6½	..	—
Brit. Elec. Traction:					
Def. Ord.	45	45	900	..	5 0 0
Pref. Ord.	8	8	170	..	4 14 2
Bristol Trams	8*	8	42/6	..	3 15 4
Brazil Traction	$1	50c.	12½	..	—
Calcutta Trams	8	5½	22/–	..	5 0 0
Cape Elec. Trams	5	5	20/–	..	5 0 0
Lancs Transport	10	10	42/6	..	4 14 1
Mexican Light:					
1st Bonds	5	5	75	+10	6 13 4
Rio 5% Bonds	5	5	92½	..	5 8 3
Southern Rly.:					
5% Prefd.	5	5	63½	+2	7 17 6
5% Pref.	5	5	104½	+2	4 15 6
T. Tilling	10	10	46/3	..	4 6 7
Tilling & B.A.	8*	7*	52/6	..	2 13 4
West Riding	10	10	39/–	..	5 2 7

(Continued on next page)

* Dividends are paid free of Income Tax.

Company	Dividend 1939–40	Dividend 1940–41	Middle Price Nov. 26	Rise or Fall	Yield p.c.
Equipment and Manufacturing					£ s. d.
Aron Elec. Ord. ..	Nil	7½	22/6	+6d.	6 13 4
Assoc. Elec.:					
Ord.	10	10	43/9	..	4 16 3
Pref.	8	8	38/9	..	4 2 4
Automatic Tel. & El.	12½	12½	48/9	..	5 2 6
Babcock & Wilcox	11	11	45/-	..	4 17 9
British Aluminium	12½	10	44/6	+9d.	4 10 0
British Insul. Ord.	20	20	90/-	−⅛	4 9 0
British Thermostat (5/-)	18½	18½	13/9	..	6 14 6
British Vac. Cleaner (5/-)	12½	10	12/6	..	4 0 0
Brush Ord. ..	Nil	Nil	4/6	..	--
Callender's ..	15	15	73/9	−⅛	4 1 4
Chloride Elec.Storage	15	15	71/3xd	+1/9	4 4 3
Consolidated Signal	17	17	75/-	..	4 10 10
Crabtree (10/-) ..	17½	17½	28/3	..	6 4 0
Crompton Parkinson Ord. (5/-) ..	30	20	20/-	..	5 0 0
E. K. Cole (5/-) ..	10	Nil	9/6	..	--
E.M.I. (10/-) ..	Nil	6	15/-	+1/6	4 0 0
Electric Construction	10½	10	32/6	..	6 3 0
Enfield Cable Ord.	16½	12½	53/9	..	4 13 0
Elecl. Switchgear (10/-)	16	10	20/-	..	5 0 0
English Electric ..	10	10	36/3	..	5 10 4
Ensign Lamps (5/-)	25	25	16/3	..	7 13 10
Ericsson Tel. (5/-)..	25*	22*	40/-	..	2 15 0
Ever Ready (5/-) ..	40	40	30/-	..	6 13 4
Falk Stadelmann ..	7	7½	19/6	..	7 13 10
Ferranti Pref. ..	7	7	26/3	..	5 6 10
G.E.C.:					
Pref.	6½	6½	32/6	..	4 0 0
Ord.	20	17½	78/9	+⅛	4 8 10
Greenwood & Batley	15	13	25/-	..	10 8 0
Hall Telephone(10/-)	Nil	10	15/7½	+7½d.	6 8 0
Henley's (5/-) ..	20	20	22/6	..	4 9 1
4½% Pref. ..	4½	4½	21/3	..	4 4 8
Hopkinsons ..	15	15	45/-	..	6 13 4
India-Rubber Pref.	5½	5½	21/3	..	5 3 6
Intl. Combustion ..	32½	30	105/-	..	5 14 3
J. Lucas	15	15	62/6xd	+⅛	4 16 0
Johnson & Phillips	15	15	55/-xd	+9d.	5 9 1
Lancashire Dynamo	20	20	63/9	+⅛	6 5 9
Laurence,Scott(5/-)	15	15	11/-	..	6 16 4
London Elec. Wire	7½	7½	25/-	..	6 0 0
Mather & Platt ..	13½	10	41/3	−⅛	4 14 1
Metropolitan Elec. Cable Pref. ..	5½	5½	21/3	..	5 3 6
Murex	20	20	91/3	..	4 7 9
Pye Deferred (5/-)	25	25	13/9	..	9 1 10
Revo (10/-) ..	5	20	25/7½	..	7 16 0
Reyrolle	12½	12½	56/3	..	4 9 0
Siemens Ord. ..	7½	7½	25/-	..	6 0 0
Strand Elec. (5/-) ..	2	4	3/6	..	5 14 4
S. Smith (4/-) ..	37½	50	7/-	..	7 2 10
Switchgear & Cowans (5/-) ..	10	15	10/-	..	7 10 0
Tel.Condenser(10/-)	Nil	5	11/3	..	4 9 0
T.C. & M.	10	10	41/3	..	4 17 0
Telephone Mfg.(5/-)	9	9	8/3	..	5 9 1
Tube Investments..	23½	20	87/6	..	4 11 4
Vactric (5/-) ..	4	Nil	3/6	..	—
Vickers (10/-) ..	10	10	17/6	..	5 14 5
Ward & Goldstone (5/-)	20	20	17/6	..	5 14 3
Westinghouse Brake	17½	10	49/6	+2/-	3 17 8
Walsall Conduits(4/-)	55	55	32/6	+⅛	6 15 4
West, Allen (5/-) ..	7½	7½	5/-	..	7 10 0

* Dividends are paid free of Income Tax.

Stocks and Shares (*Concluded from page* 617)

4 per cent. The North Eastern Electric Supply Co., for example, has an issue of £2,202,000 5 per cent. consolidated debenture stock over which the company has the right of redemption in whole or in part on or after July 1st, 1940, at 102. Any stock outstanding in July, 1980, will be repaid at 100. Another example is a comparatively small amount of Electrical Finance and Securities 5½ per cent. debenture, which is redeemable at the company's option at 100 in whole or in part at any time after 1940 upon six months' notice being given. Any stock outstanding at the end of 1963 will be repaid at 100.

These are two examples of the stocks which are likely to be affected by the new decision of the Treasury, for it would seem improbable that companies of this nature, which can offer first-rate security, will continue to pay more than 4 per cent., at the outside, where they have the right to repay existing issues that bear a higher interest charge. With to-day's demand for security so keen as it is, no surprise would be felt if the companies were to exercise their right of repayment and to offer, in exchange, new stocks in the 3½ per cent. class. Holders of the securities would have no ground for grievance if conversion were to be carried out, because the terms of the issues have always been well known.

As an instance of a longer-dated stock, County of London Electric 5 per cent. debenture is interesting. The stock cannot be paid off at 100 until January, 1965, at the earliest—and to-day's price is 115.

Difficulties in Dealing

The famine in the supply of ordinary shares in the best class of industrial companies would be almost amusing if it were not distinctly exasperating. The exasperation comes to the prospective purchaser who wants the shares for permanent keeping, while his Stock Exchange broker, and the jobber who deals in the particular shares that are required, feel aggrieved at being unable to carry out the wishes of the public. It may not be difficult to deal in 50 or 100 shares, though every now and then the intending buyer finds that not even 100 shares are to be obtained. Shares can be sold readily enough, but the dealer who buys them may already be short of them and requires what he buys in order to fulfil sales made previously.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1*s. each*) *can be obtained from the Patent Office*, 25, *Southampton Buildings, London, W.C.*2.

1939

25158. "Wind-power electrical generators." J. H. Alexander, W. J. H. Kirkpatrick and G. Armstrong. September 9th, 1940. (540789.)

1940

5531. "Electrical communication systems." Telephone Manufacturing Co., Ltd., and L. H. Paddle. March 27th, 1940. (540763.)

5538. "Radio transmitters." Marconi's Wireless Telegraph Co., Ltd., C. S. Cockerell and G. P. Parker. March 27th, 1940. (540764.)

5856. "Braking field electric oscillatory circuits." Marconi's Wireless Telegraph Co., Ltd. March 31st, 1939. (540827.)

7530. "Photo-electrically-sensitive electrodes." Baird Television, Ltd., and A. Sommer. April 26th, 1940. (Addition to 532259.) (540739.)

7534. "Electric battery charging circuits." Standard Telephones & Cables, Ltd., and G. E. Ross. April 26th, 1940. (540740.)

7535. "Automatic telecommunication systems." Standard Telephones & Cables, Ltd., E. P. G. Wright and G. C. Hartley. April 26th, 1940. (540741.)

7536. "Metal-to-glass seals." General Electric Co., Ltd., R. L. Breadner and R. W. Douglas. April 26th, 1940. (540742.)

7657. "Fading compensation arrangements for radio receivers." Marconi's Wireless Telegraph Co., Ltd. April 27th, 1939. (Addition to 539793.) (540800.)

7659. "Impulse modulation of high-frequency oscillators." Marconi's Wireless Telegraph Co., Ltd. April 29th, 1939. (540828.)

7691. "Power amplifying circuits." Fabbrica Italiana Magneti Marelli. May 3rd, 1939. (540834.)

7797. "Frequency-changing circuits particularly for the reception of ultra-short electromagnetic waves." Standard Telephones & Cables, Ltd., and C. W. Earp. April 30th, 1940. (540837.)

7799. "Frequency deviation alarm circuit." Standard Telephones & Cables, Ltd., and W. J. Frankton. April 30th, 1940. (540838.)

7801. "Telegraph systems." Standard Telephones & Cables, Ltd., and C. W. Earp. April 30th, 1940. (540839.)

7814. "Inductance coils." H. W. Sullivan, Ltd., and W. H. F. Griffiths. May 1st, 1940. (540770.)

8217. "Portable battery-energised electric lamp." E. L. Eastell. May 7th, 1940. (540862.)

8703. "Electric signalling or control apparatus." Bush Radio, Ltd., W. H. Harrison and H. L. Fletcher. May 15th, 1940. (540863.)

8867. "Ventilating and air-conditioning systems." E. T. Fisk. June 23rd, 1939. (540802.

9180. "Radio transmitters for ultra-high frequencies." Electrical Research Products, Inc. July 26th, 1939. (540773.)

9182. "Transmission systems for high-frequency electro-magnetic waves." Standard Telephones & Cables, Ltd. May 26th, 1939. (540842.)

9216. "Constant impedance load device, particularly for modulating systems." Marconi's Wireless Telegraph Co., Ltd. May 24th, 1939. (540804.)

9294. "Thermionic relay systems." Marconi's Wireless Telegraph Co., Ltd. May 27th, 1939. (540754.)

10706. "Resistance materials and methods of making the same." Standard Telephones & Cables, Ltd. June 23rd, 1939. (540844.)

11912. "Propeller fans." Keith Blackman, Ltd., and D. S. Woodley. July 19th, 1940. (540755.)

11960. "Electric flash lamps." British Thomson-Houston Co., Ltd. July 22nd, 1939. (540846.)

12111. "Rectifier arrangements for charging electric batteries." Crypton Equipment, Ltd., and R. Squire. July 24th, 1940. (540782.)

12137. "Cores for instruments, apparatus, and machines making use of magnetic induction." E. P. Harrison. July 25th, 1940. (540869.)

12223. "Depolarisation of primary cell batteries mounted in torch cases." C. A. Becker and L. E. Simmonds. July 27th, 1940. (540810.)

12453. "Direct current electricity meters." Landis & Gyr. Soc. Anon. August 5th, 1939. (540811.)

12516. "Radio beacon circuits." Standard Telephones & Cables, Ltd. August 3rd, 1939. (540871.)

13051. "Lightning arrestors." British Thomson-Houston Co., Ltd. August 18th, 1939. (540848.)

15629. "Circuit arrangements for gaseous electric discharge devices." British Thomson-Houston Co., Ltd. October 24th, 1939. (540874.)

1941

513. "Devices for interrupting the ignition current of internal-combustion engines." Hasler Akt.-Ges. Werke für Telephonie und Prazisionsmechanik. February 17th, 1940. (540786.)

Amended Specification

538243. "Washing machines." British Thomson-Houston Co., Ltd.

New Standard Specifications

COPIES of the revised specification (B.S. 542–1951) for cable glands and sealing boxes for use in mines will shortly become available from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 3d. each, post free.

The second of the three principal modifications in the revision of B.S. 29–1941 relating to carbon steel forgings for ship and marine engine purposes is that provision is now made for the inclusion of steel made by an electric process. Copies are obtainable from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 3d. each, post free.

American Electrical Exports

Improvement in First Half of 1941

DURING the first half of 1941 United States exports of electrical machinery and appliances totalled $65,301,000 in value, an improvement by $7,281,000 on the corresponding period of 1940. There were increases in the majority of the items making up the machinery and switchgear groups, compensating for the decline in batteries, washing machines and a number of minor items.

	Jan.-June 1941 $(000)	Inc. or dec. $(000)
DC generators	651	+ 395
AC generators	653	− 479
Steam turbine generator sets under 500 kW	41	+ 12
Ditto 500 kW and larger	713	+ 378
Accessories and parts for generators	477	− 85
Motor-generator welding sets	673	+ 105
Non-rotating welding sets	101	− 190
Self-contained lighting outfits	1,080	+ 410
Wind-driven generators	250	+ 22
Storage batteries, 6 and 12 V	1,233	+ 273
Other storage batteries	276	− 15
No. 6 dry-cell batteries	57	− 24
Flash-light batteries	1,057	− 767
Other multiple-cell dry batteries	97	+ 4
Other dry and wet cell primary batteries	93	− 15
Capacitors, ½ kVA and larger	32	− 26
Power transformers, over 500 kVA	840	+ 574
Distribution transformers 500 kVA and less	605	+ 115
Instrument transformers	89	+ 30
Other transformers	744	+ 373
Mercury power rectifiers	9	—
Rotating convertors under 300 kVA	199	+ 37
Ditto, 300 kVA and larger	170	− 61
Complete battery chargers, non-rotating	220	+ 102
Feeder voltage regulators	59	+ 7
Switchboard panels, except telephone	840	+ 480
Oil circuit-breakers and switches	226	+ 41
Power switches and circuit-breakers over 10 A	853	+ 175
Fuses	170	+ 75
Watt-hour and other meters	349	− 82
Elec. indicating instruments	451	+ 104
Elec. recording instruments	205	+ 71
Other electrical testing apparatus and parts	1,027	+ 183
Lightning arrestors, choke coils reactors and parts	264	+ 21
Motors, 1/3 HP and under	473	+ 90
Ditto over 1/3 and under 1 HP	216	+ 43
Stationary motors, 1–200 HP	1,254	− 110
Ditto over 200 HP	566	+ 98
Railway motors	12	− 59
Elec. locos., railway, mining and industrial	582	+ 138
Elec. industrial trucks and tractors	664	+ 411
Starting and control equipment for industrial motors and parts	1,089	− 143
Ditto for railway and vehicle motors and parts	91	+ 20
Accessories and parts for motors	909	− 256

There were at the same time noteworthy increases in locomotives, trucks and tractors, lighting accessories, portable tools, furnaces and household refrigerators. It may be recalled that in 1940 exports of the last-named were at an exceptionally low level. The following table gives values of exports during the first six months of this year as compared with the corresponding period of 1940.

	Jan.-June 1941 $(000)	Inc. or dec. $(000)
Portable elec. tools	1,347	+ 632
Household refrigerators and parts	5,190	+ 603
Commercial refrigerators and parts up to 1 ton	535	− 204
Parts for elec. refrigerators	2,376	− 284
Flashlight cases	321	− 9
Electric fans	311	+ 28
Lamps for automobiles, flashlights and Christmas trees	295	− 181
Other metal filament lamps	992	+ 412
Other electric lamps	189	+ 115
Searchlights and airport beacons	3,129	+2,202
Floodlights	79	+ 7
Household washing machines	349	− 365
Household washing machine parts	114	− 17
Domestic vacuum cleaners	162	+ 57
Domestic vacuum cleaner parts	157	− 19
Other domestic motor-driven devices	142	− 52
Electric flat-irons	150	+ 50
Electric cooking ranges	201	− 4
Other domestic heating or cooking devices and utensils	388	− 18
Elec. melting furnaces and parts	332	+ 178
Heat-treating furnaces and parts	428	+ 170
Other industrial heating devices and parts	209	− 72
X-ray tubes	249	+ 22
Other X-ray apparatus and parts	864	+ 70
Other therapeutic apparatus and parts	256	+ 71
Radio transmitting sets, tubes and parts	1,912	+ 285
Receiving sets	5,456	+ 722
Receiving valves	1,293	− 105
Receiving set components	2,897	+ 107
Loudspeakers	163	− 49
Other receiving-set accessories	355	+ 57
Telegraph apparatus and parts	291	+ 137
Telephone instruments	181	+ 68
Other telephone equipment and parts	1,717	− 90
Bells, buzzers, annunciators and alarms	205	+ 11
Starting, lighting and ignition equipment	599	+ 47
Insulating material	320	+ 45
Rigid metal conduit	540	+ 223
Other metal conduit outlet and switch boxes	420	+ 138
Sockets, outlets, fuse blocks, lighting switches and parts	1,277	+ 323
Interior lighting fixtures and parts	1,065	+ 228
Exterior lighting fixtures and parts	133	− 70
Other wiring supplies and line material	589	+ 4
Electric razors	57	− 22
Other electrical apparatus	6,304	− 782
Grand total	65,301	+7,281

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia. — SYDNEY COUNTY COUNCIL. — December 18th. High- and low-voltage cables for the Bunnerong power station. Specification 560.

January 29th. Steam and feed water piping for No. 10 turbo-alternator for the Bunnerong power station. Specification 559.

South Africa.—DURBAN.—January 16th, 1942. City Council. Potential and current transformers. Contract E.2038.

JOHANNESBURG.—December 27th. City Council. Low-voltage metal-clad switchboards. Contract 883. Oil-immersed circuit-breakers. Contract 884.

Orders Placed

Ilkeston. — Education Committee. Recommended. Installation of mains lighting in trenches.—B. J. Legg (Industries), Ltd. (£457); Derbyshire & Notts Electrical Power Co. (£149).

London.— HAMMERSMITH.— Borough Council. Accepted. E.h.v. switch and metering equipment, at Standish Road pumping station (£506). —J. G. Statter & Co., Ltd.

Notts.—County Highways Committee. Accepted. Lighting traffic signs at Oxton roundabout (£106 for installation and 12s. a quarter for electricity).—Derbyshire & Notts Elec. Power Co.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Askern.—Canteen; Askern Coal & Iron Co., Ltd., 52, Leadenhall Street, London, E.C.3.

Bebington.—Tunnel shelters (£20,000); Francois Cementation Co., Ltd.

Blackpool.—Youth centre; T. T. Jones, town clerk, Municipal Offices.

Boxmoor.—Adaptation of Boxmoor House for use as remand home (£1,500), for Herts C.C.; Clerk's Department, Castle Street, Hertford.

Cheshire.—Shelters (£60,000) and rest camps (£16,000); county architect.

Coventry.—Rebuilding ward block at isolation hospital; D. E. E. Gibson, city architect, 1a, Warwick Row.

Croydon.—Proposed extensions at Mayday Hospital, Thornton Heath; E. Taberner, town clerk.

Chorlton-on-Medlock.—Extensions to works; Drury & Gomersall, architects, Imperial Bldgs., Oxford Road.

Darlaston.—Canteen at works, Willenhall Road and Perry Street; J. Garrington & Sons, The Green.

Didsbury.—Offices, Oakfield road; I. A. Mitchell, Ltd., Harvester House, 37, Peter Street, Manchester, 3.

Dumbarton.—Business premises, Glasgow Road; Dumbarton Equitable Co-operative Society, Ltd., Main Street, Old Kilpatrick.

Glasgow.—Extensions, Balmore Road; A. P. Newall & Co., Ltd.

Extensions, Old Shettleston Road; A. & D. Turner.

Factory; Mavor & Coulson, Ltd.

Hull.—Hutments, nursery blocks and dining-rooms; A. Rankine, city architect, Guildhall.

Levenshulme.—Boiler house, Paragon Laundry; Paragon Cleaners & Dyers, Ltd., Chapel Street.

Lincolnshire.—Rebuilding Old Leake Council School; W. M. Smith, Holland county architect, County Hall, Boston.

Maryport.—British restaurant; U.D.C. surveyor.

Middlesbrough.—Combined rescue and cleansing depot, Mill Hill Farm; borough engineer.

Newcastle-on-Tyne.—Offices, etc., Shields Road, for C. A. Parsons & Co., Ltd., Heaton.

Canteen for Michell Bearings, Ltd., Paradise Street; Cackett, Burns Dick & McKellar, Ellison Place.

Romford.—Additions and alterations to fire station (£1,200), and improvements at first aid posts (£3,325); borough surveyor, 8, Hall Road.

Rugby.—Additional wards, Hospital of St. Cross; W. T. Loveday, architect, 2a, Lawrence Sheriffe Street.

Southall.—Canteen, Windmill Lane; Associated Equipment Co., Ltd.

Staffordshire.—New schools, Bentley Road and Addenbrooke Street, Darlaston; K. L. Murray, county architect, County Buildings, Stafford.

Stockton-on-Tees.—Works kitchen for Athole G. Allen (Stockton), Ltd.

Thrapston.—Houses for Oundle and Thrapston R.D.C.; F. J. Short, surveyor, Council Offices, Thrapston, Northants.

Wakefield.—Additions, Duke of York Street, for W. H. Nicholson & Sons, Ltd.; W. H. Ogden, architect.

Additions, Henry Street, for J. G. Waterhouse, Ltd.; J. Percy Firth, architect.

Extensions, Belle Vue; Slater & Crabtree, Ltd.

West Lancashire.—British Restaurants for R.D.C.; R. Rosbotham, surveyor, Council Offices, Derby Road, Ormskirk.

Wigan.—Offices, near Scholes Bridge; T. Kelly, 165, Millgate.

Yorkshire.—Canteens, Pickering School and Richmond Grammar School for North Riding Education Committee; J. C. White, county architect, County Hall, Northallerton, Yorks.